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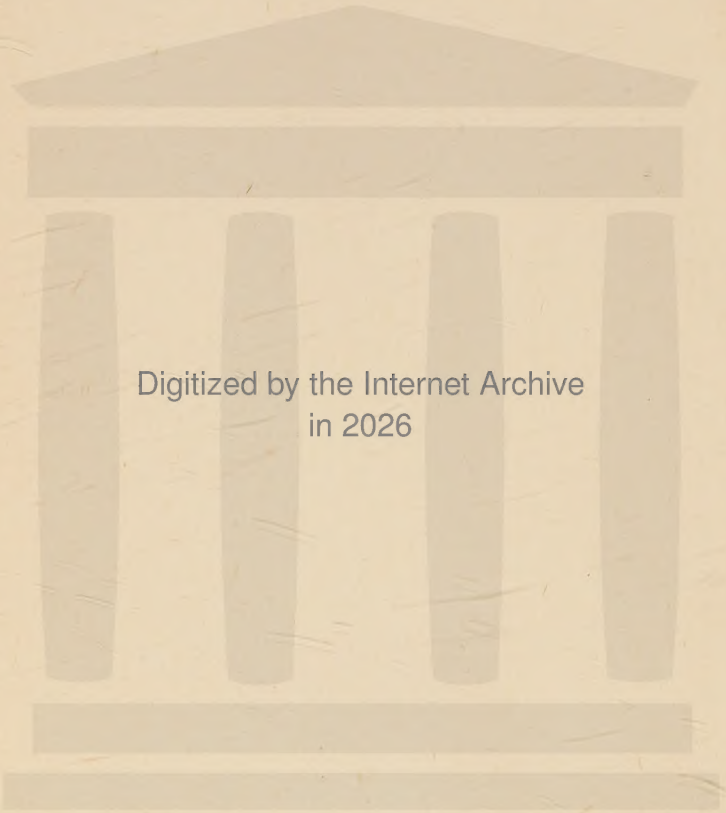
SANDERSON OF OUNDLE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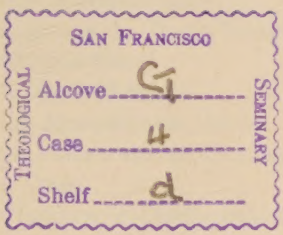
THE HEAD LEADS THE WAY

# SANDERSON OF OUNDLE




GRADUATE

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*From a Snapshot by H. E. Galloway, Esq., taken in the Spring of* 1922


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# CHAPTER THE FIRST

## INTRODUCTORY

ON a hot, close afternoon in June 1922 a crowded audience in the semicircular Botanical Theatre of University College, London, listened with some difficulty but with profound interest to a characteristically discursive address by F. W. Sanderson, the Headmaster of Oundle School. Many of them saw him then for the first time, for he made few public appearances in London. They saw him as a stout, ruddy man, speaking in a rich jolly voice through a thick reddish moustache; his eyes twinkled humorously behind his glasses as he flashed in some quick allusion from platform to audience or from audience to platform; he held to the high desk in front of him with both hands; he was obviously a little tired and oppressed by the warmth of the day, but with a marked gaiety and defiance in his voice and manner. He was telling of the experiment to which his life had been devoted, the creation of the great and successful public school with which his name will now be linked for ever.

He said all that he had to say and sat down. Then, as the chairman of the meeting was opening the discussion of this address, the lecturer slipped from his chair to the ground and in a few minutes died of heart failure. As soon as he fell, and the seriousness of his condition was realised, the chairman asked the audience to disperse, but some still lingered and mingled with the startled reporters below the

platform. All the windows had been opened, but the air was heavy and breathless. On the platform a few friends and associates, and one or two of his old boys who had come to hear him once again, stood or knelt down beside the still body that, a few minutes before, had been a buoyant, jesting maker of thoughts and men.

In this fashion it was that the subject of this book died. It was a dramatic ending to a great career. The obvious comment was that it was a happy thing to die so swiftly and painlessly in the very hour of complete self-expression, but to many of those who knew Sanderson best it came with an effect of premature truncation. We had hoped to have him with us yet for many years. His tradition was still in the making and no successor had yet been indicated to carry on that great adventure in education, Oundle School. It was already clear to several of us before we left the Botanical Theatre that day, that there rested upon us an obligation to do all that we could do to record and preserve and continue his magnificent beginnings. It is out of that conviction that among other efforts this book has been made. It is an attempt to give an account of Sanderson and of his ideas and his will, not simply or chiefly as a memorial to him for those who knew and loved and honoured him, but as a record of the work and development of one whom we firmly believe to have been the greatest and most fruitful of all contemporary educationists. Our task is not primarily the task of praising and preserving the memory of Sanderson ; it is the much more important task of saving all we can of Sanderson for the world.

There have been many contributors to this book, more than fifty people have made contributions to it, but they are all anonymous, and a small editorial committee has done what it can to weld all this various material together

into one continuous book. Changes in style and occasional repetitions are unavoidable in an undertaking of this kind, in the sermons and addresses particularly there is considerable repetition and overlap, which makes for emphasis and lucidity at the cost of compactness, but we have done our best throughout to make this story easy to read and the development and drift of Sanderson and his Oundle plain. We shall have failed if we do not convey to the reader something of our own belief that the life of Sanderson was a cardinal event in the history of human education.

To begin with, we shall give a compact account of his private and domestic personality; then we shall tell in outline the history of the revivified Oundle School, which he raised from comparative obscurity to its present eminence among English public schools, with some account of its distinctive methods in this department and that. From this we shall go on to the development of Sanderson's ideas, drawing largely upon the manuscript drafts of his sermons that he left in his study. We shall then print his chief papers and addresses—he was not an easy writer or speaker and they are not very numerous.

His last address to the National Union of Scientific Workers was a very important declaration of views and intentions. He prepared numerous manuscript drafts, and one of these he had printed. This address was indeed a culmination of statement for him. We shall give both the printed draft and the actual discourse.

In this way we hope to make as plain and concrete and personal as possible that educational message for which Sanderson of Oundle lived and died.

## CHAPTER THE SECOND

### THE MAN HIMSELF

FREDERICK WILLIAM SANDERSON was born at Brancepeth in Durham in May 1857. His father was employed in the estate office of Viscount Boyne, and the son began his education in the local school. He became student teacher in the neighbouring school of Tudhoe: overcoming many difficulties he gained a foundation scholarship at Durham University. His tastes and ambitions seemed to point at first to the Church, and it was as a theological student he entered Hatfield Hall, Durham, in 1876. He was keenly interested in theology, a much more stimulating and invigorating study than many outsiders suppose; he gained the Van Mildert Theological Scholarship in his first year, and was to the end of his days intellectually 'theological.' But he did not take orders. How far there may have been any difficulties of conscience in that it is now impossible to say. In those days Anglican orthodoxy was much more rigid and implacable than it is to-day, and the teaching in his sermons, as the reader will see later, was of a very broad and liberal type.

Theology was not his exclusive preoccupation. He was much attracted by mathematics and natural science, and gained the Durham University Mathematical Scholarship. He was placed in the first class in Mathematical and Physical Science in the Final Examination for the B.A. degree, and afterwards became examiner for the

Honours Mathematical papers at Durham, and in 1879 won an open Mathematical scholarship at Christ's College, Cambridge. In the Mathematical Tripos he was 11th wrangler, and in the examination for the Smith's Prizes was bracketed third. Whilst at Cambridge (where he failed in his hopes of winning a College fellowship) he was elected Fellow of Durham University. He was too discursive in his interests, too apt to follow up difficult or curious points, instead of covering the ground with that systematic method, neither deep nor shallow, which makes the successful examinee. But he was already known as an able teacher, and he stayed on at Cambridge for three years as a lecturer at Girton and a private coach. In the vacations he took undergraduate reading parties to Switzerland and the Rhine.

In 1882 at the wedding of a college friend in Cumberland he met his future wife, Miss Jane Hodgson, daughter of the late Tom Hodgson of Broughton Hall, Cumberland. He was married to her at Allonby, in 1885. There were three children—Roy Broughton, born in 1889, who was killed in France in April 1918; Thomas Stuart, born 1890, who is a barrister; and Mary Dorothea (now Mrs. Marshall), born in 1897. The marriage was a very happy one. He had found a loyal and courageous helper who was to stand by his side unflinchingly through the days of hard work and bitter struggle that lay before him. To his wife, moreover, he owed his introduction to the mountains of the Lake District, in which he afterwards found his chief exercise and recreation. The honeymoon was spent in Switzerland. Mountains had taken hold upon his imagination; they held it as the imaginations of other men are held by the desert or the sea.

Just before his marriage he became Senior Physics Master at Dulwich College under the Rev. J. E. C. Welldon (now

Dean of Durham), and it was at Dulwich that he made his first ventures in the educational use of practical science. At that time boys intended for engineering would be withdrawn long before they had had a sound general education and sent into business, and it was to keep them a year or so longer that the scientific workshop was first introduced into this particular school. But he speedily realised the enormous educational value of these new facilities, more particularly in arousing the interest of boys not stirred by ordinary literary studies, and he had gone far in the direction of their development before he was called to Oundle in September 1892.

We shall tell of the development of Oundle under his headship, and of his own development under the stimulus of the Oundle opportunity, in the next chapter. We shall tell there also of the bitter antagonism his innovations aroused and how near he came to defeat and resignation. All the rest of him is so interwoven with that story that we are left with little to tell of him outside of it. During term time his whole waking existence was work and the Oundle struggle. He got little or no exercise. He had never had the leisure to achieve any great skill in school games, and he never took part in any except tennis. This lack of habitual exercise is a common and almost unavoidable misfortune among overworked men. He was one of the earliest riders of the old high bicycle now relegated to our museums, and he rowed a little at Cambridge. At Oundle he would sometimes play tennis with a senior boy or an assistant master. For some years he took a daily bicycle ride of about nine miles, but this was dropped as the demands upon his time increased. Very rarely he would snatch a visit to the Oundle golf links. No doubt this lack of regular exercise did much to shorten his life, for he was naturally of a burly, hearty build. It was only in the

vacations among the mountains that he found the possibility of effective recreation.

In 1895 he went to Norway to see the eclipse of the sun, and did some mountain walks. In 1896, mindful no doubt of the success of his undergraduate reading parties on the Continent, he started the first of the Lakes reading parties, his object being to widen the basis of 'scholarship' in the school. These parties were attended by about 12 to 20 boys and by masters whose names will be familiar to all old Oundelians, Mr. Hale, Mr. Mercer, Mr. King, and Mr. Nightingale. While these parties abundantly achieved their object and contributed very largely to the scholastic successes of the school at that time, they were also a source of great delight and reinvigoration. A house was taken for August in the Lake District, and a considerable amount of material from the school was taken with the party. On one occasion the Head got into trouble with the police. The van had gone astray and he cycled without a light into the village in search of soap and candles. Unhappily he cycled into a policeman and was fined half a crown by the Ambleside Bench.

The day's work of the Lakes parties consisted of three hours' regular work in the morning and two hours at any time in the afternoon. The afternoon of Wednesday and the whole of Saturday were devoted generally to walking expeditions over the Fells, each year supplying its number of athletes who would 'do the three peaks,' that is to say, climb in one day, Scawfell, Helvellyn, and Skiddaw, each over three thousand feet high, a task involving a walk of some thirty miles. Mountaineering was the only form of athletic exercise that made any real appeal to Sanderson. He had not, at this time, attempted the sport of rock climbing. He was introduced to that later by his sons when staying at Wastdale in 1906. Although

then nearly fifty years of age, he took it up with whole-hearted enthusiasm and with a success surprising in a man of his years and unathletic habits. He had previously visited Switzerland with his family and there enjoyed both ski-ing and tobogganing, but he cared little for these once he had learnt the joys of rock climbing, and from 1906 till the outbreak of war his holidays, whenever possible, were spent among the Cumberland mountains, with occasional visits to Wales and the Isle of Skye. He loved the comradeship of a mountaineering party and the struggle with difficulties and the triumphs which were shared in common.

The outbreak of the war was an immense tragedy for him. Up to the very last moment he believed that the war would be averted. In the sermons and lectures we shall give later the reader will find evidences of the tremendous disillusionment of the war, and the valiant efforts he made to reconstruct his shattered conceptions of state and duty, in the light of the moral and intellectual collapse that the war and the disastrous unsettled peace that followed it entailed for him. Throughout the war he clung to the phrase that this was ' the war to end war.' His instincts were passionately patriotic and he threw himself with all his energy into war work and especially into the making of munitions, for which the school workshops were particularly suited. There is no doubt that the difficulties and toil of those days undermined his health very seriously. He felt the loss of so many old boys and masters with great intensity, especially perhaps that of Captain F. C. Norbury and Lieut.-Colonel G. A. Tryon, two masters for both of whom he had a keen affection. Colonel Tryon, after serving all through the war, met his death within a few days of the Armistice. But the greatest blow of all to him was the death of his eldest son Roy, who died of wounds at

THE HEAD ROCK-CLIMBING

Estaires on the 17th of April 1918 at the age of 29. Roy, a scholar of Queens' College, Cambridge, had previously worked as an Engineer for the London & North-Western Railway, but later, to his father's great pleasure, had accepted a post as Master at The Royal Naval College, Osborne. The two had closely sympathetic minds, and to him Sanderson had looked for the development of his own education ideals.

Sanderson's last years at Oundle were troubled by signs of ebbing strength. In 1920 he was affected with heart trouble. He was advised that he was overtaxing himself, but he would never consent to any degree of work less than the utmost of which he was capable. The work of the school after the war was particularly heavy, and he was now doing much outside the school. His reputation throughout the country was growing rapidly, and this entailed continual requests for lectures and addresses. He felt it a duty to respond to them, though he was not naturally a good speaker and found difficulty both in preparing and delivering his speeches. Latterly he seemed to recover, and at his daughter's wedding to Mr. Desmond Marshall, an old Oundelian, on the 22nd of February, and at the Old Boys' Gathering on the 10th June 1922, he appeared in excellent health and spirits. On Wednesday the 14th June he visited the Rothamsted Experimental Farm with Mrs. Sanderson and went on next day to London, staying at the Welbeck Palace Hotel. He visited his optician, rested after lunch, and then went out to give his last lecture. We have told already how that ended.

To a great multitude of people his loss was an occasion for deep distress—they had lost an irreplaceable counsellor and helper—but, except for members of his own family, he left behind him few very intimate personal friends. He

was a deeply affectionate man, but he was not a demonstrative one, and it is the almost unavoidable tragedy of so busy and useful a life that it allows little time for those small abundant responses that are needed to establish a deep and enduring friendship. A thousand fine contacts such a man may have, but few intimacies. And originality also is a source of loneliness. Intimacies demand habituation, and the original mind is a perpetual fount of disconcerting changes.

His tastes and habits were very simple. As a young man he had been fond of smoking, but he gave it up on becoming Headmaster of Oundle, because he found smoking prevalent in the school. He liked things about him to be neat and well appointed but not crowded; his desire for 'spaciousness' was a physical passion. He was fond of pictures and had an abundant knowledge of them. Though he had a poor ear for music he took great interest in the school singing, and interested himself later in the interpretation of music. He was well read in most branches of English Literature, and though probably without the finest perception of literary art, reading rather for help and information than for pure intellectual enjoyment, he had nevertheless a keen appreciation of what he read. He had an extraordinary faculty for picking out the 'gist' of a book quickly. He had been at one time a great reader of Dante. Although through want of time he had been forced to abandon his early researches in Mathematics and Physics, he took a lively interest in almost all branches of Science. In later years he gave more and more attention to social and economic subjects.

As a family man he was unselfish and indulgent, and few men have been more indifferent to money or spent it more readily. Here we may not tell of his many private and secret generosities. Although his life had its full share

of difficulties it was an eminently happy one; apart from his interest in his work he loved life in every form. He delighted in children. He was at home with them at once. On his first visit to the new Preparatory House, in which he always took great interest, he was seized by the small boys, who at once recognised a friend, taken behind an apple tree, and made to join in a game of hide and seek. At his children's Christmas parties he would make the most jovial of Father Christmases. To see other people happy and hilarious made him a beaming, chuckling figure of delight. He was always ready to take a share in any fun and jollity, and nothing pleased him more than the Christmas entertainments given to the school staff. These he never failed to attend, taking his full share in the dancing and all the amusements.

## CHAPTER THE THIRD

### THE RENASCENCE OF OUNDLE SCHOOL

§ 1

OUNDLE SCHOOL is old among English schools. It was certainly in existence in 1485. Conceivably there was a school in Oundle before 709, but there is no proof of any continuity before the later date. In 709, Wilfrid, Archbishop of York, afterwards canonised as St. Wilfred, died at Oundle in the monastery he had founded there a few years previously. During his life he was an active and aggressive churchman and politician. He was a great educationist, journeying all over the country and even as far as Rome, seeking for men qualified to be schoolmasters in his various foundations, and it is highly probable, since he had a house there, that he provided a schoolmaster for Oundle. But that candle of learning, if indeed he lit one there, may soon have been blown out again by the Danish invaders.

The definite history of the present school began in 1485 with Joan Wyatt, who founded a guild to support two priests at Oundle, one of whom was to be a schoolmaster. The Commissioners of Edward VI. suppressed the chantry but continued the school, in the same building and under the same schoolmaster as before. Shortly after (in 1556) Sir William Laxton, Sheriff and Lord Mayor of London and Master of the Grocers' Company, bequeathed property in London to the Company on condition they supported a school in his native town of Oundle. The Company

accepted the trust and became, and have remained ever since, the governors of the school.

Some delay occurred in carrying out the directions of Laxton's will, but possession of the buildings was at last obtained. The Wardens of the Company visited Oundle, inspected the buildings, and appointed John Sadler headmaster on the new foundation (he had been master in the old school for some years) at a yearly salary of £18, 6s. 8d.

The school was a boarding school from the first. It was not an elementary school; one of the 'statutes' enacted that no boy was to be admitted to the school until he was able 'to write competently and read both English and Latin.' The appointment of the second headmaster is probably quite unique in the history of any British school until very recent years, for the governors chose a science man, a certain Mr. Wilkinson, Doctor of Physic. After Wilkinson's retirement there seem to have been difficulties in the school, several of the headmasters proved unsatisfactory, and the attendance fell away, but in 1626 the school entered into a period of extraordinary prosperity. Remembering that the population of the country was then only one-seventh of what it is now, the school must have been a large one, for it numbered over 100 boys. It had a larger proportion of the population in it then than it has now, even at the height of its fame. The boys came to Oundle from all parts of the country, some even from abroad; we have to remember the difficulties of travel in these days to realise the significance of this fact. Manifestly the school must have had a very considerable reputation. Further proof of this is afforded by the fact that in many cases boys came from towns in which competing schools had existed for many years.

The boys entered about the age of eleven and stayed four or five years; the school hours were long, four hours in the

morning and four or sometimes five in the afternoon, and not more than one half-holiday was allowed in the week. The master and usher were given twenty days' holiday each year, but during the absence of one of them the other was to superintend his work, so apparently the boys had no holidays at all. They made one journey to the school and one journey home at the end of their schooldays.

The old school seems to have been very democratic in character. We find (the school register starts in 1626) clergymen, knights, baronets, 'gentlemen,' bakers, viscounts, barons, tailors, farmers, grocers, drapers, cobblers, lawyers, and one undertaker entering their sons in the same year. A large proportion of the boys on leaving the school entered the Universities, generally Cambridge. The tendency of the school, like that of the surrounding district, was towards puritanism, so that many boys entered the puritan colleges of Emmanuel and Sidney-Sussex. A good many obtained scholarships and several fellowships. One of the early entries in the register is Edward Maria Wingfield, nephew and namesake of the first president of the Colony of Virginia (1607). Almost the next entry is John Newton, afterward D.D. and Chaplain to the King. This John Newton was a great advocate for educational reform, and he wrote books to facilitate the use of logarithms in schools. He protested strongly against Latin and nothing else being taught in schools, and complained there was 'scarce a grammar schoolmaster in the kingdom competent to teach arithmetic and astronomy.' It is odd to find how Oundelian Oundle has always been. A little later we find three Montague brothers entered; they were cousins of the Earl of Sandwich and so connections of Samuel Pepys who frequently mentions them in his Diary; the eldest was appointed one of the commissioners to receive King Charles from the Scots, and another became Attorney-General

and Lord Chief Baron. His wife put Pepys 'in an ill-humour all day,' being less beautiful than had been reported. John Creed also, whose name frequently occurs in Pepys, had a son at Oundle. Thomas Allyn, the son of a grocer, entered the school in 1630; afterwards, as Lord Mayor of London, he headed the procession which welcomed Charles II. on his restoration. Oliver Luke (school in 1634) was the son of that Sir Samuel Luke who attained immortality as the original of *Hudibras*. Many of the boys took part in the civil war, the three brothers of John Claypole, 'that debauched ungodly cavalier' who married Cromwell's favourite daughter Elizabeth, were naturally on the Parliament side; others were royalists. One of these latter was Richard Washington, a cousin of Laurence Washington who emigrated to America and was the great-grandfather of George Washington.

Many other names of important old Oundelians could be mentioned, but the above are perhaps enough to show that the school produced a variety of types of men doing useful work in the country. In 1666 the school was closed owing to a visitation of the Plague. Towards the end of the seventeenth and for many years in the eighteenth century there were financial difficulties owing to the destruction of house property in the Fire of London. Boarders came no longer and even the day boys were very few. For a time the latter also disappeared and the school ceased. It was a time of educational lassitude in England. In 1762 an attempt was made to revive the school, but it was not until 1796 that the effort met with any success. In that year Thomas Bullen was appointed headmaster, and a new scheme was brought out for the school. Again the Oundelian trend of Oundle was manifest. Technical science was introduced; boys were to receive 'a competent idea of the several manufactures and the metals from the

rude material and the mines to their last improvement.' How fully this scheme was carried out we do not know, but we do know that Thomas Dix, the usher, published a book on 'surveying' which was used in the school for many years. If the spirit pervading the other teaching was the same as that shown in this book, the school must have been far ahead of the times in its attitude towards education. Numbers increased. Boys were again drawn from all parts of the country. From 1830 to 1876 the school varied in numbers, but seems to have carried on the work of a regular country grammar school with considerable success. Towards the end of this period, under the headmastership of Dr. Stansbury, the standard reached by the best boys in mathematics was high. There was also litigation with the Grocers' Company during this phase. The Laxton bequests in London had increased greatly in value, and the Grocers' Company was spending only a portion of the accruing wealth upon their educational obligations. The Oundle people sought to compel them to devote all to this local end. The Grocers made a successful legal defence, as they had done on a previous occasion in the seventeenth century, but it was plain that they considered the honour of the Company bound up with the success of the school, and that they had no intention of restricting their efforts to their legal liabilities. The later history of the school shows how well they have realised their opportunities.

In 1876 there was again a change in organisation. The school was divided into two portions. The Laxton Grammar School was to serve local needs and be mainly a day school; the Oundle School was to be a boarding school of a higher type. Both were to be under one headmaster. Oundle School, thus separated from local services, entered a fresh era of prosperity under the headmastership of the Rev. H. St. J. Reade, the classical work of his senior boys

being quite exceptionally good. The numbers rose to 200, but then a fresh period of depression followed. From 1883 to 1892 was a phase of relaxed energy and decline.

Sanderson's predecessor from 1884 on was the Rev. Mungo J. Park, a great-nephew of Mungo Park the explorer. He seems to have been a very thorough believer in that favourite English proverb 'live and let live.' He made neither the boys nor the staff do more work than they felt inclined to do, and he set a fine example of tolerant, undriven, scholarly dignity. Old Boys describe him as a remote but greatly respected figure. A few boys and some of the staff carried on the tradition of sound classical scholarship established by Reade, there were a few star cricketers, and the rest of the boys loafed and learnt little or nothing. Some of the members of the staff were in holy orders, and upon Sundays they found a pleasant and profitable relief from school duties in taking church services in the district. The school indeed was very much like many other of the lesser English public schools; the majority of the boys learnt little except that vague limited gregariousness known as *esprit de corps*, cricketing sentiment, and a gentlemanly habit of mind, though a clever and curious boy might, with tact and without offence, acquire a certain amount of stereotyped classical erudition. And for a time the staff seems to have found nothing distressful in the fact that the number of boys in the school was dwindling.

But the stir of educational reform was already in the air, and when the roll approached one hundred, the Grocers' Company decided to take drastic action. It made an inquiry into the condition of things in Oundle School and sought a headmaster of a new type. There seems to have been a considerable dissension among the Grocers about the policy to be pursued. Some were for continuing the

school as a good classical school; others were for modernisation and the introduction of scientific and technical subjects. The latter were in the majority and Sanderson was appointed, largely on account of his excellent work at Dulwich in science and engineering.

§ 2

Every new headmaster is faced by difficulties on taking up his new duties, but circumstances had conspired to make Sanderson's advent at Oundle particularly unwelcome. His very appointment was a condemnation of the staff and the school. He was appointed to reorganise, to innovate, and to put fresh life into a school which in most departments had sunk into a state of lethargy. He came to a school bristling with resistance, ready and anxious to see him fail.

Whatever sort of man he had been, hostility would have been his lot, but he was as a matter of fact a very downright, uncompromising and resolute personality, and his first years at Oundle were extremely fierce and bitter years. An early account of him, by an assistant from the old order who was ever one of his staunchest supporters, describes him then as a tall slight figure, always, unless in cap and gown, wearing a tall silk hat. Several of the assistant masters were considerably older men than himself.

Trouble arose almost from the beginning because of the Head's determination to take part in the school services. He held also that the scripture teaching in the school was under his supervision although he was not 'in orders.' The district was a strongly conservative one, prepared to be offended by the appointment of a lay headmaster, an innovation well calculated in those

F. W. SANDERSON: AN EARLY PORTRAIT

days to stimulate clerical opposition. A campaign of religious and social intolerance began. The new Head was declared to be theologically unsound, poisoning the minds of the innocent young boys committed to his care. The senior boys were inspired to hostile criticism, furtive ridicule and open insubordination. The staff disobeyed the orders or invented ways of misunderstanding them and making them unworkable. Some of the local residents demonstrated their opposition by those social slights so easy to recognise but so hard to describe. The half-falsehoods, the base imputations, which contribute so large a part to the gossip of sections of English country life, concentrated upon the invader. At one time Sanderson felt his position so intolerable and hopeless that he wrote out his resignation. He sat alone far into the night composing his desolating admission of defeat.

But he never sent in that resignation. He had brought in new men to the staff and some of the old staff were supporting him. He had brought in several boys from Dulwich. What was to happen to these boys and helpers if he went? And the Grocers' Company, and particularly such men as Mr. Frank Pownall and Mr. J. R. Drake, had put their faith in him and he could not fail them. He held on. He held on grimly, sometimes silently, sometimes with thunder-bursts of rage. He tightened up the discipline of staff and boys alike. But it took seven years of conflict and bitter worry before it became manifest that he was fully master of the school and his opportunities.

To suggest that in these seven years of conflict he never made mistakes would be absurd. Words were spoken which on reflection he wished unsaid, and deeds were done which afterwards he wished had been done otherwise. But he was a man of strong feelings, sorely tried. Seven years of trouble, worry, and antagonism will leave their mark on

any man's character, and Sanderson's did not escape. In some ways he was strengthened, he had fought opposition and had won, he had found difficulties which appeared insurmountable and had overcome them, he had faced failure and put it behind him. Never afterwards would he believe any difficulty insurmountable, never would he believe in even the possibility of failure. But there were other effects also. His solicitude for everything connected with the school extended to the most minute details; he had no desire to 'interfere' but he had to 'know,' he did not feel safe unless he knew. With part of the staff in open or veiled opposition he had felt he was being 'kept out,' and never was he quite able to rid himself of this feeling. In after years he liked to be told 'at once' and if possible 'beforehand' of anything happening. With some who did not know him well, this appeared to be a desire on his part to have a finger in every pie, but it was nothing of the sort, it was merely the shadow of the old fear of being 'excluded.'

He was a man impulsive by nature, but the years of trouble taught him caution to some extent. 'Let me sleep on it' was a favourite reply of his to any one bringing a suggestion. To make a proposal to him was like planting a seed. He would not act forthwith. He must go away and examine it. It must be left to germinate; afterwards, perhaps in a few hours, perhaps a few weeks, sometimes even a few terms, he would return to the sower and ask him to tend the plant; never did he forget who had sowed the seed, but always there was that interlude.

'In all the years of trial,' writes one who went through the conflict with him, 'and in the years of success which followed, it is difficult to express the part played by Mrs. Sanderson. She entered into his plans and hopes, shared his worries and difficulties, sometimes she exerted a

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restraining influence, but never did she hamper. She was ready at any moment to help in any way possible ; in early days when the staff was small she taught in school ; she had a very large part in the starting of the hostel boarding houses which we shall presently describe, she managed the school laundry and the sanatorium, and always in times of sickness she was a tower of strength to all, to house-masters, to matrons, and to parents who came to visit their sons whilst ill at school. Many are the parents who remember with gratitude the help and comfort received, and look back with thankfulness to the sympathy and strength they received from her in their time of anxiety.'

§ 3

It will be interesting to interpolate here two impressions of Sanderson during these years of suspicion and conflict. They are both by old Oundelians who were under him in those days, and are of special interest, for they show the prejudice and antagonism of ignorance giving way to the admiration and respect of knowledge.

'Sanderson's predecessor,' writes one already in the school when Sanderson arrived, 'was an example of the old type of "Dominie"—he gave an impression of stoical aloofness and insusceptibility to emotion of any sort. He had been a good cricketer in his day, I do not think he was very keen—at least he did not show it—to do too much work himself—a Headmaster not too curious about detail, not too exacting in study.' 'The first impression of Sanderson was a surprise. He was young—or comparatively so—he was a man of Science and not a classic—he was in earnest, and showed it;—and strangest of all, he was not in Orders—a technical flaw which shocked the piety of our youth extremely.

'His first reform—if it may be so termed—was a small one, but it touched our dignity profoundly. One morning he announced that he expected the whole school, and not simply the choir, to join in the hymn that was sung on certain mornings in the week. The upper school promptly decided that this was *ultra vires* and inconsistent with its dignity, and for several mornings nothing was heard but the shrill voices of the smaller boys. The new Head said nothing. As time went on the V form fell into line, but the VI form remained firm in stubborn refusal to open its lips. But time was on the side of the Head, one or two of the old sixth maintained their silent dignity to the end; at last a new sixth stood—and sang—in its place.

'Hard on the "singing" question there followed the formation of a new modern side of the school, the erection of various new laboratories and workshops, and as a natural result the elevation of boys who had been rather junior on the classical side into new modern forms which corresponded to the senior forms on the classical side.

'It was felt by the old group of leaders that something must be done to show the Head the error of his ways. The Debating Society seemed a suitable forum. It was resolved to have a play—or rather a mock trial of a supposed incendiary who had been caught trying to burn down the laboratories and workshops. The play was written by co-operative means, and it seemed to us in those days quite the wittiest production that had ever been. It was full of caustic—not to say envenomed and insulting—references to singing, laboratories, workshops, engineers, and in fact to everything dear to the Head. It went very far. The surprising thing was that no one in authority took any notice of this "Bolshevik" proceeding. The rehearsal went on for two or three weeks. I cannot recall the be-

haviour of the staff in this matter. It may be we had strong sympathisers there. There may have been helping hands. The Head seemed to be quite unaware of what was going on—and though he had attended debates before, he never looked in.

'At last the day came for the final rehearsal, and with it, soon after the proceedings opened, the Head. We fired our barbed darts with a slight intoxication at our own wit and daring—amidst a ragged and unconvinced applause. He sat through it with his head down gazing at the floor. At the end there was a pause—a stillness that could be felt. We wondered what would happen. The silence lasted for what seemed a long time, then Sanderson lifted his face, rose slowly in his seat, said "Boys, we will regard this as the final performance," and walked meditatively out of the room. That was the end of it—he neither sent for the Head of the School nor the prefects. He just left us to it.

'It was the "end of the performance" in more ways than one. We were all, I think, rather conscious that we had gone too far, and we admired the quiet way he had sat through our jokes, had not stopped it on the spot as he might have done, and still more the absence of comment, or objurgation. The mock trial had stated the case against the Head, it had done more, it had over-stated it. We began to realise a little the forces of spite and obstructiveness with which our youth was in alliance.

'After that, most of us in the sixth began to sing—and accept the *fait accompli*. . . .

'"Boys," said Sanderson, in almost his last words, "have only one characteristic in common—their dislike to any change." How pregnant to Oundelians of a generation ago with memories of Sanderson's coming to Oundle,

memories of a Classical Sixth and Upper Fifth, whose pride of place could brook no peers unqualified by Classical study! They passed on, and Sanderson remained—remained to build, not to destroy the old order, for as he said, "A modern education does not consist in discarding Greek."

'The Oundelians of a generation ago went out into the world, and as the years have passed, some have regretted that they had not in their youth the vision to see the future as Sanderson saw it a generation ago, and regretted that Homer and Hydrostatics seemed so incompatible then.'

§ 4

Here another Old Boy tells of these early days.

'To us early Oundle Boys of the nineties Sanderson did not do himself full justice. He did not explain himself—perhaps he could not explain himself—and, uninterpreted to the censorious young, many of his acts and pronouncements seemed fantastically wrong-headed. Looking back, one wonders whether he was so sure of himself and his ultimate ends as to feel no need for present justification—or whether, doubting the issue of his experiment or his own abilities or methods, he hesitated to declare his aims and disclose his hand until the system had been proved by tangible results.

'Certain it is, however, that had he been able to reveal himself more clearly and definitely he would have found a group of boys ready and ardent to put his quickening ideas into active practice. But the highly conventional and matter-of-fact schoolboy intelligence was incapable of bridging the non-conducting vacuum that the Head's inarticulateness left between his apparently unrelated acts and any apprehended standard of life and conduct. With-

out a " Sanderson's Revised Standard of Values " and a " Sanderson's Chart of Life and Service " we young voyagers were sadly at sea and out of our reckoning as to what was the meaning of this or that enactment or of this or that dark saying. The new riddle went the rounds as " Old Beans' latest." . . . Well, anyhow that made us think. You know, of course, we called him " Beans."

' However subversive of public school ideals we might consider him, we never credited him with any but the best intentions. I am glad to say, very glad now, that on the whole I was pro-Sanderson. Topsy-turvily enough, I recall my own mid-schoolboy attitude to the Head as one of a quasi-paternal affection—I would take his part in dormitory debates, seek to excuse or palliate his alleged atrocities, or explain away some more than usually " balmy " pronouncement. I would appease outraged schoolboy propriety by a reminder that " Beans " was frightfully well-meaning, though of course, I was sometimes driven to admit, hopelessly cracked, and that we mustn't be too hard on the " Old Man " as, in spite of the bats in his belfry, he could be a very decent sort so long as one didn't get him " waxy."

' For he could get " waxy," tremendously " waxy." I think that made for respect. His explosions of anger—those sudden, unaccountable thunder-bursts from out an apparently clear sky, were occasions not soon to be forgotten by those present, especially by those conscious of ill-doing—which meant most of us. When the bolt fell, and the victims had been told to present themselves at the Head's " School Study " for retribution, we who had suffered the ordeal in person knew the awful uncertainties of their situation. He exercised his punitive functions at a white heat of passion, possibly because then and only then

could he trust himself to operate effectively. To the malefactors, however, this explanation did not occur, and we merely knew that, having sown the wind in some form or another, we were fated to reap the whirlwind—almost literally—a hail of swishing cane strokes that seemed almost to envelop one, as the attack usually had more of *élan* than of definite objective. The expiatory strokes were liable to fall on one's back or legs, one's hands or forearms —departures from orthodox practice much canvassed by the school as breaches of the unwritten charter of schoolboy rights and liberties—as possibly illegal and actionable. The matter, however, never got further than academic discussion. We were discussing a question of style rather than principle. Corporal punishment brings with it its own consolations of martyrdom—an almost comfortable glow of exaltation, pride in one's fortitude, a consciousness of being the object of general sympathy and interest, and a feeling that one had expiated one's crime, that bygones are bygones, and that one can forthwith and honourably prepare for some new naughtiness if one is prepared to accept new risks.[1]

'I recall this phase of his earlier period here because if one is to get at all a true view of his personality, it is clearly necessary that we note all aspects and phases of his character, however at variance they may seem with the final and total sum of his attributes, indeed most especially because of their curious inappropriateness.

'These explosions of anger no doubt appeared pecul-

[1] But another collaborator in this book comments here that this is from the point of view of a boy. He declares that these 'explosions of anger' were often deliberate acts. There were times when the Head would confide to some of the staff that a 'flare up' was needed to clear the air. The explosion followed duly. Sanderson was not a believer in corporal punishment, even in early days, but he preferred it to the iniquitous system then in vogue of 'setting lines.'

iarly awful to us because of the general serenity of their background, a superficial view of the Head seeming to show an indulgent man of almost indolent good nature. Somehow the alert intelligence and burning enthusiasms that were the real Sanderson had got themselves into the outward semblance of a soft-living prelate of the old school, and though his comfortable habit of body may have proved a useful reservoir of nervous energy, it may also have accounted for the periodic ebullitions, these nervous explosions through the restraining crust of eupeptic well-being. Later, and naturally, these things came to an adjustment, and the Head mellowed and matured into him whom we knew in his latter years—a man of unbounded charity, even for those whom he considered " the enemies of the people." I suppose, as it is the fashion to put it nowadays, he had achieved " Poise."

' In later years he clearly became far more accessible to the boys in general, and I envy my successors their opportunities.

' In his expansive moments he was always delightful, and when he was " in form " his science lessons were a pure joy. He would whimsically put himself on the level of his class and join in the pursuit of some (to us) new piece of knowledge with a humour and ingenuity that made the demonstration an intoxicating adventure, a raid into new and unknown territory, and that ultimately brought our morning's objective into sight as a blazing revelation. One longed that he might guide one further and more often, but with the constant growth of the school, the Headmaster inevitably rather ate up the Teacher. I think he particularly liked teaching divinity, but, so far as I was concerned, his magic did not extend to this subject, and his analytical and comparative methods in studying the Bible left me indifferent for long to the whole field of theology,

and with a satiated distaste for the Old Testament and even for the Gospels.

'Undoubtedly in my case the effective approach would have been through poetry and literature—if we were using the instruments of scientific research I was impatient that they should be employed on anything so academic and remote as Biblical history; I wanted, boy-like, to go on making the thrilling and illuminating "discoveries" that natural science yielded so miraculously under the Headmaster's guidance. Who could really care about Assurbani-pal or the Syrian succession, when Boyle and Dalton were waiting for us in the labs? No doubt the divinity lessons were reckoned as providing the literary factor of our education, for, so far as I can remember, the science and engineering sides in my day were shown no other path to Olympus. . . . No, I am wrong! Twice and twice only (if my memory serves me) we were given an essay to write. I remember the subjects yet, and I vividly recall my thrill of delight at this rare opportunity for written self-expression and even some remembrance of what I wrote. . . . But all that was altered later. . . .

'The many rare qualities and the great-heartedness of Sanderson are in no danger of being forgotten, but to recapture that peculiar tang and flavour of his character that made him in many ways so unique, one must recall the little twists and quirks that seasoned his personality.

'I know that we talked of him as "effeminate," and credited him with a distaste for exercise[1] and a liking for good living, chiefly because he had never been seen to play

[1] His lack of inside knowledge of games was to Sanderson a matter of deep regret. He was keenly interested and took a real delight in all matters athletic. He held that every boy should take an active part in the games. Old Oundelians will remember the scorn with which he spoke of the game he called 'Watch Cricket.' To an 'Aristocracy of Athletes' he was however strongly opposed.

games and because he did not appear to be in "hard condition." It is an undeniable fact, I fear, that to command the full respect of the very young male a master must give some proof of physical prowess—or at least have some athletic legend attached to his name. It was even suggested that the Head was "not a public-school man and did not know what was what," and—precious examples of what is what!—that his bow ties were of the "made-up" variety and his cuffs detachable. Such is the snobbishness of little boys that these ridiculous falsehoods were enough to prejudice one's regard. As a matter of fact, Sanderson was always scrupulous in his dress, and never either eccentric or untidy.

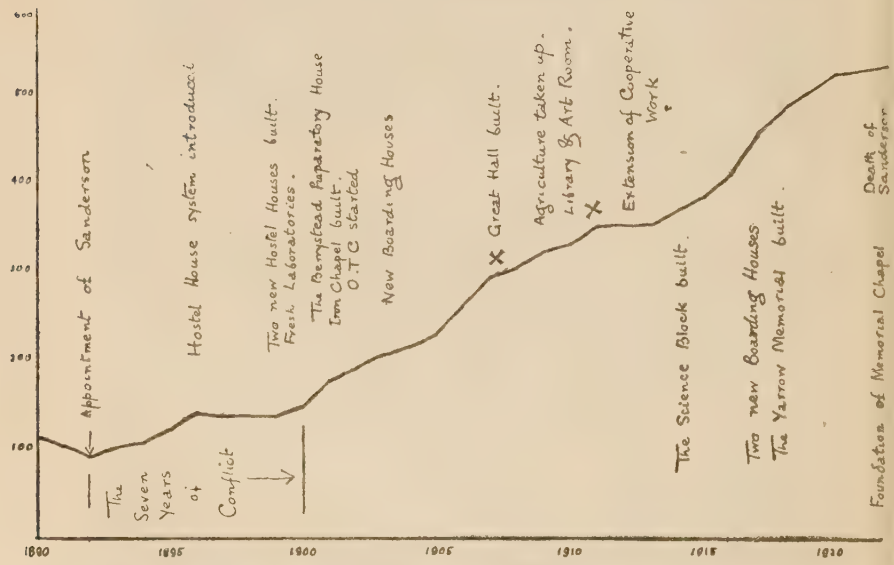
'But I am speaking of the early days of Sanderson's administration. The legend of his essential greatness soon came to be so well established that trivialities were forgotten and ignored in the radiance that seemed more and more to surround him. He won over the boys steadily. He conquered the new boys who came, and not only the new boys. He won over old boys who had spent their school-days in opposition, so that they came back to talk to him and to learn from him belatedly and with an ever-increasing respect.

'With advancing years, with the triumph of his ideals and the realisation of so many of his aims, he mellowed and softened in a delightful way, his power of expression increased, his vision ranging far beyond his own or any other school into the distant future of the human race.

'He displayed latterly, perhaps above all things, an amazing sense of proportion; a realisation indeed of what were the great things and what the small; what stood for true human progress and what was reactionary and anti-social. He became a discomposing though amiable exposer of all shams and pretensions, possessing, as he himself

asserted, "a secret touchstone" by which he tried the worth of all actions and professions. His own set of values he continued to keep steadfastly inviolate and constant, untouched by any taint of opportunism, unwarped by any concessions to expediency.

'To say that he had his crochets, and Sanderson had plenty, is to say that he was human. He used to amuse




himself and others by his vehement denunciations of the "Possessivists," against whom he carried on a perpetual pogrom—half serious, half fantastic. Whilst genuinely mistrusting and detesting the self-seeking and all their works, he would sometimes go to extravagant lengths in denouncing some pillar of society as a "possessivist" of the most dangerous and pernicious sort—probably a "Crypto-Possessivist"—only to end in laughing at himself and his "Heretic Hunting" with that comfortable

infectious chuckle of his and a "What?—Well, well, well!" If Sanderson was filled with a "consuming fire," it was a fire which burnt up shams and hypocrisies, but for enthusiasms it was a source of warmth and comfort. Yes, he was greater than we knew. Even now perhaps we are short of realising his full measure.'

§ 5

From the end of the seven years' struggle, from 1900, that is, onwards, the progress of the school was continuous; the accompanying trace shows one aspect of the case, the growth in numbers. In themselves numbers are not all-important but they do mean something; a school which is either full or growing is supplying a want which is felt by the public. With a school such as Oundle, where pioneer methods were adopted, numbers were important for they showed the methods adopted were successful, that the public appreciated them, and so encouragement was given to persevere with what was already accomplished and to strike out into fresh experiments. The curve is of interest in several respects; it shows the check to the fall in numbers which occurred on Sanderson's appointment, the slow increase during the first troublous years, the steady and more rapid rise afterwards. On two occasions at least there is a pause in the growth. These we have indicated by crosses. The Governors declared the school to be full and desired to have no more boys taken. Sanderson respected their desire, hence the check, but the demand for entrance was too urgent, the numbers again rose. When the war broke out the entries were so numerous that there was no possibility of many of the boys ever coming to the school, the waiting list grew longer and longer until it became necessary to refuse to accept a boy's name unless he would be under age for entry in three years' time. Even this

restriction was not enough, boy after boy had to be refused even when his name had been entered with what seemed to be ample forethought.

Sanderson was not a believer in large numbers, but he had a strong belief in the rightness of his principles, and would have liked every boy to have the chance afforded by his methods ; in recent years, when he had to refuse many entries, it was a real trouble to him. He wished every boy to be free to go to the school where he would derive most benefit, and after school he would have every boy free to go to the University undeterred by any " compulsory " subject in the entrance examination. He would have had only one test for entrance, and that was the boy's suitability to profit by the course of study he proposed to pursue. To carry out Sanderson's principles with full benefit to the boys numbers were necessary ; it was only as the school grew that he was able to develop schemes he had long contemplated, and even the numbers reached in the last few years were too small for some schemes to be fully carried out. He wanted enough boys for every fresh field of work he opened out, and as the range of the school widened so did its capacity for boys increase. The more boys the greater choice, the better adaptation of work to the gifts and possibilities of the individual. Sanderson was proud of the growth of the school, he delighted in new buildings and fresh equipment, but it was on sounder and more technical grounds that he rejoiced in its continual expansion. He was an expansionist to the end. To the day of his death he was evolving fresh schemes.

Sanderson was always averse to boys working individually, he wished them to be together in forms. As individuals they lost the stimulus and help of a body of people working for the same end, the " atmosphere " was wanting. For some studies there were always candidates enough to

make up a form of workable size, but it was only as the numbers increased that it was possible to obtain whole classes in other subjects. It was in this way that numbers were necessary for the carrying out of Sanderson's methods.

If the development of the school is measured by the list of buildings erected, changes of syllabus, introduction of fresh subjects, it is of interest as a record of material success, but it gives a very false impression of what was really taking place; it is only when the idea at the back of all the changes is understood that the development really begins to 'live.' If the curve of numbers be considered in connection with the schemes of work, it will be found that the two act and react on one another in a most intimate way. A growth in numbers makes some experiment possible, the success of the experiment brings an increase in numbers, this again renders a further experiment possible, and so the process goes on. In 1892, on Sanderson's appointment, there were 92 boys in the school divided into seven forms; a few boys in some of the forms did Science, a few were called 'specialists,' and some took German instead of Greek. Sanderson at once divided the school into groups, Classical, Modern Languages, Science and Engineering, and Junior School. In this way 'specialists' disappeared and became members of a form.

The formation of the Science and Engineering side necessitated workshops and laboratories. Something of this kind had existed before but only of a very primitive nature. The building next the churchyard, formerly the school-house, was made use of for this purpose and considerable alterations were made. Two dormitories were thrown into one room which became the chemical laboratory and class-room. The chemical laboratory was fitted with two working benches and could accommodate about twelve boys; the other end of the room was fitted with

desks to accommodate another twelve and formed the class-room. On the ground floor the old ' common-room ' was fitted with tables and shelves and formed the physical laboratory for about a dozen boys. The corner room, the old dining-hall, was fitted as a workshop : six carpenter's benches, a few vices for iron work and a small treadle lathe formed the whole equipment. The rooms were small and in many ways inadequate, but they formed a starting point.

In the years 1893-4 a photographic club was started which led to important developments ; a gymnastic class was tried, but was abandoned owing to the unsuitable nature of the room used. The literary and debating societies, defunct for some years, were revived, and the choral society was founded. The year 1897 saw the beginning of an experiment which had a great influence on the history of the school. One of the house-masters was appointed to a headmastership and left Oundle, his house was taken over by the Governors and run as a ' hostel house,' *i.e.* a boarding-house run financially by the school, and not by the house-master as the older custom was. The experiment was a success in many ways ; the houses started in subsequent years were all carried on on the same principle. Hostel houses were in existence in other schools, but the new hostel house at Oundle differed from these in one important particular ; the boys in each house were absolutely separate from those in every other house ; they did not meet in a central hall for meals or for preparation : each house had its own dining-hall, common-room, and studies. As far as the boys were concerned the arrangement was almost the same as that of a proprietary boarding-house. One important result of this scheme was to give the headmaster more control over the houses ; it must be remembered this was the time at which opposition ran strong. Another point was that, since no financial responsibility

attached to the house-master, no vested interests grew up. The profits of the house belonged to the school and could be, and were, used to give financial assistance to boys who were unable to win scholarships but were nevertheless valuable and useful members of the school. The career of many boys who were enabled to come to the school in this way fully justified the experiment even had there been no other advantages.

The year 1899 saw the numbers in the school increased to 140: more boarding-house accommodation was needed. The Governors built a new pair of hostel houses on the field. The engineering side had also now grown to more than double its original size, the laboratories were too small, new ones were built on the site of an old Fives court. The building of the physical laboratory, in particular, emphasised one of Sanderson's principles, that of giving the best equipment possible to a boy. In the construction of the room, no iron was used, gas and water pipes were of lead or copper, brass screws were used instead of nails or steel screws, so that tables and benches could be used for electrical or magnetic experiments free from the disturbing effects of induced magnetism. For the more delicate apparatus solid brick piers were provided to avoid vibration.

A bad outbreak of measles in 1901 was traceable to the use of Jesus Church immediately after it had been occupied by the local school-children. So disorganised did the work become through this epidemic that Sanderson took the bold step of giving up the use of the church. A special licence was obtained from the Bishop, and services were held in the gymnasium for two terms, while a temporary chapel was built.

In the autumn of the same year a preparatory house (Berrystead) was started. The Science Society was reorganised in 1902 and its scope was very much enlarged;

also the Cadet Corps was started; this at first formed a cadet unit of the Northamptonshire regiment but afterwards became a unit in the O.T.C. junior division. The temporary chapel came into use in 1902. It was built originally to seat 200, but was extended and extended again until at last it would accommodate over 600. The Head was resolved that the entire school should take part in the services. The choir, instead of containing a small number of picked voices, was enlarged till it took in nearly half the school; but even this was not enough to satisfy Sanderson's idea that every individual should take a definite part in the service. The music was arranged so that not only trebles and basses had their allotted parts but a definite portion was given to the 'non-choir.'

Organ recitals were given on Sunday afternoons and quickly became a regular school institution. In the summer term of 1902 a performance was given, on the cricket field, of *A Midsummer's Night's Dream*. It proved a great success and was the forerunner of many dramatic performances, some in English, some in French, some by senior boys, others by the juniors.

The room originally fitted up as a workshop soon proved too small; it was enlarged, first by taking in the passage and afterwards the adjacent room, but space was still limited, and the shape of the room was inconvenient. In 1904 new shops were built, new machinery was bought, a power-house was attached to the workshop and all tools were electrically driven. Electric light began to take the place of gas in the school and boarding-houses.

No sooner were the workshops built and fitted than the scheme of work was enlarged. Sanderson was always strongly in favour of the work done in the shops being 'real,' something that boys would realise at once was of genuine value; models and toys and petty jobs were all useful

enough in giving a certain manual dexterity, but genuine commercial work could be made much more truly educational. The whole process from drawing-office to the final erecting and testing, he held, should be followed, if possible, and a real insight gained into the reason for the design, into the properties of various materials used, and into the way in which each part fulfilled its purpose. The realisation of this ambition was greatly helped by Mr. Hunter, of the North-Eastern Marine Engineering Company, who supplied the rough castings for a reversing engine of about 6 h.-p. for use with a 3500 h.-p. marine engine. The whole of the fitting, finishing, and erecting was done in the shops and the engine finally tested there. When fitted in the ship it was found to work very satisfactorily. The next year a similar engine was built. This was followed by the making of a lathe and electric motor of about 9 h.-p. The latter is still in use for driving the machinery in the workshops. The building of these engines necessitated a new drilling machine far larger than any before possessed, also a planing machine; these were forthcoming and enabled further work to be done.

The years 1905-6-7-8 were years of steady growth and consolidation; more boarding-houses were built, the laboratories extended; more playing-fields were levelled and the laundry erected and equipped. It was a period of quiet work well done, and meeting with marked success as the long honours lists of each year witnessed.

For many years a large class-room known as the 'Upper Room' had been used for prayers in the morning and for entertainments, concerts, lectures, and such like gatherings of the whole school. As numbers increased it became impossible to accommodate every one in this room; prayers were read sometimes in the gymnasium, sometimes in the chapel and sometimes even in the cloisters; occasionally

the town-hall had to be hired for entertainments. For Speech Day the gymnasium was used, but this also was too small; the side of the building was taken out, a platform built inside for the performers, and a large marquee erected outside for the audience. At last, towards the end of 1908, the Great Hall was built and it became possible for the whole school, now 300 strong, to meet again in comfort. For a time in the Great Hall there was even room for expansion.

In the same year, 1908, some land was purchased near the school and agricultural experiments were started, at first of a comparatively simple nature—the testing of new varieties of wheat, the intensive growing of potatoes, and the like. Experimental gardens were planted, and gradually the school farm was evolved and boys were enabled to take Applied Biology or Agriculture as an essential part of their education.

In 1910 the library, art room, and art class-rooms were added to the Hall. From the beginning of his rule Sanderson had endeavoured by lectures and exhibitions to stimulate an interest in art, not in the technique of art but in its influence on the life of nations. He held that the history of any period could be best studied through the masterpieces of art, music, literature, or architecture, for they reflected not only the soul of the artist but the best and highest aspirations of the people among whom the artist lived. The walls of staircases and corridors had for a long time been covered with photographs and reproductions of the great masterpieces of the Old Masters and of the great modern artists, of Egyptian, Assyrian, and Greek sculpture, and the architecture of our great cathedrals and churches. It was not, however, until the art room and library were built that he was able to carry out his scheme on a scale at all approaching the importance he attached to

THE GREAT HALL

the subject. A large collection of Arundel and Medici reproductions was formed and placed on exhibition.

'A system of dramatic recitation has been practised in the school for several years. Every term a play of Shakespeare, previously adapted for the purpose, is selected, and each character is assigned to a small group of boys. Each of the boys in the group learns the part and discusses its interpretation with the others. This grouping is one of the essential features of the scheme, the idea being that the more backward boys, finding they are supported, learn confidence and often develop quite unexpected abilities. Another advantage is that boys learn the language and meaning of Shakespeare, not by the master's instruction, but by reciting and acting, and, *mutatis mutandis*, the system in this respect corresponds to the practical method in science and mathematics, and the direct teaching of languages. As the recitation takes place on the stage of the Great Hall, with the master standing in the body of the room, the boys must necessarily learn to enunciate correctly and distinctly. Any tendency to force the voice or to mumble can be checked with ease. As the term progresses the meaning of the play grows clearer, and the action is carried on with increasing vigour and dramatic feeling. At the end of the term the play is acted, with dress and scenery. But, in addition to this performance, a public recitation is given by each of the Forms, and it is an exhilarating spectacle to see groups of young boys reciting their parts; in their enthusiasm they lose themselves in the characters they are representing, and forget that they are only reciting a part. The parts are arranged so that each group of boys, as far as possible, has the same amount to learn.'

The root-idea of this group study and production of a play is co-operation. It was an idea that was becoming

dominant in Oundle. The idea had been rising to predominance in Sanderson's mind for a long time, but the final impulse required to launch it into his scheme of education undoubtedly came in the years when the engines were being built in the workshops. In this job each boy had his own part to do ; the separate pieces when finished were ' assembled ' and formed part of the completed whole. Here each boy's work was independent of that of all the others, and yet was essential to all the others. The boy learnt his own part thoroughly and obtained a very good general idea of the work of all the others. When erection was complete all could take an interest and pride in the final testing, for each boy, responsible primarily for a part, was yet responsible for the whole. A failure at any point meant a break-down in all. Each boy knew and felt that others depended on him ; he was spurred to his best efforts, not by the spirit of competition but by the spirit of co-operation. Exactly the same principles were applied to the play. Textual criticism and ' scholarship ' necessarily took a secondary place in such a scheme.

To the co-operative spirit Sanderson now sought to appeal in the study of all subjects ; if it could be made successful all round the stimulus to work was provided from inside and all forms of compulsion or penal work could be abolished. It has been stated that this was actually done at Oundle ; it was certainly done to a large extent, but Sanderson was far too practical a man to regard it as more than an ' end ' to be desired ; the fact remains that the more the system was introduced the less need there was for punishment.

The scheme of co-operative working essential in the workshops, and introduced with success in the recitation and, as we shall presently describe, in the mathematical work, was rapidly extended. It was particularly applicable to applied

science ; for this purpose ample space was necessary where experiments could be carried out on a large scale. The Science Block was built in 1914 ; it contained chemical and physical laboratories far larger than the old ones, a drawing office, and a biological laboratory where work hitherto carried on in adapted rooms could be continued in suitable surroundings. Above all it contained a Machinery Hall suitable for testing purposes and for experiments on a large scale.

This building was completed just when war broke out. The war came at first as a disruption to the orderly development of Oundle. In the end it proved to be eminently stimulating and reconstructive. The school, like everything else in the country, had to adapt itself swiftly to new and difficult conditions. Special forms and classes were arranged for the senior boys who would presently be called to the army, time was given for military subjects. Experimental agriculture became ' food production.' The workshops were changed to munition shops, the carpenter's shop was moved to the old gymnasium, making room in the metal shops for more machinery, the munition work was carried on throughout the school, in lesson time and in play hours, sometimes even by night as well as by day and for a good part of the holidays. The school turned out 12,376 finished parts, mainly in connection with torpedo gear, for Messrs. Peter Brotherhood ; for Woolwich Arsenal 32,008 parts, draw punches, clamp screws and punch holders ; for the Munitions Board 1393 horse shoes and 1216 timber dogs. Besides this much of the work in the carpenter's shop was directed to the military hospitals. Yet the inertia of growth carried on the process of expansion. The numbers in the school increased so rapidly during the war period that two new boarding-houses were started and filled immediately.

Sanderson himself had not a moment's rest in term time or the holidays; the strain told on his physical health; there were great difficulties of organisation under war conditions, but, more than all, the death of boy after boy whom he had seen grow up under his care distressed and exhausted him. When in 1918 the death of his own son occurred a breakdown was almost certain ; it came eight months later, and in physical vigour Sanderson was never again the same man. Mentally he did not change ; a sort of feverish energy possessed him now that took no heed of waning strength.

In spite of the disturbances due to the war, much progress was made throughout the war period. The co-operative method was extended to biology ; the agricultural plots and the garden became a farm, and an actual farm class was formed ; the English work was extended and became the Library Scheme, to be presently described. All the time there was hovering in his mind and gradually taking shape a scheme for the part schools were to take in the reconstruction of the world after the war. This entailed some knowledge on the part of the boys of social conditions, not only in the present but in the past, and the slow evolution of the former from the latter. He began to realise the full importance of history in education. His ideas met with much sympathy from Sir Alfred Yarrow, who provided the funds for a building to be devoted to the realisation of this historical idea. The actual building was finished in 1918 ; the way in which it was to be used was much in Sanderson's thoughts in his last years. He called it at various times the Museum of History, the Heart of the School, the Temple of Vision.

One point to him was quite clear, co-operation had to be introduced into industry, not in the ordinary meaning of profit sharing, which he always considered a very minor

issue, nor in the sharing of work and responsibility; for in joint boards or Whitley Councils he had little faith. But just as in school work each boy did his portion and brought it when finished to be fitted to the final product, so in industry each man was to do his work with full knowledge of its importance, knowing and feeling it was an essential part of a whole, that the efficiency and success of that whole depended upon his individual effort. Just as the master by sympathetic supervision could help the work of his form, so the public-school boy (after leaving) would take his place in the industrial world and render his help to the social uplifting of the people.

A considerable amount of his time in the last few years was taken up in preparing papers to be read before societies and clubs, often composed of business men, in which these ideas were embodied. These papers, or rather the preparation of them, had an influence on the school, for they gave the result of Sanderson's experience and so called attention to loose ends which required tying up and frayed edges to be bound. He was asked to tour in America and give a series of lectures on his educational aims; the invitation tempted him but he felt his health was not equal to the strain.

The years after the war were of necessity years of settlement and consolidation, the filling up of gaps and rounding off of corners. The carpenter's shop was permanently separated from the metal shops, the whole workshop scheme was enlarged, the 'forge' was added to the scheme and the foundry completed. An Observatory, long desired, was erected in his last year to accommodate a telescope given by Mr. W. T. Carr. One great experiment was tried in 1921, the whole school choir, non-choir, and orchestra taking part in the production of Handel's 'Messiah.'

§ 6

The editors of this book have found very considerable difficulty in getting impressions of the appearance and effect of Sanderson in the pre-Oundle days, and in the days of his beginnings at Oundle. Perhaps this difficulty occurs to all posthumous biographers. Their informants have grown and changed with their subject; the old friend has continually effaced his past by his continuing present. The memories of later and earlier days coalesce and overlap. It is evident that the accounts we have given heretofore of his beginnings are 'boy's eye' views, and to a boy a young man may seem old, and a very normal man a powerful giant. Early photographs show Sanderson lean and keener looking and less warmly genial than the Sanderson we knew; he looks with a challenging eye upon the world; the kindly wrinkling round his eyes behind his glasses marked his ripening years. One old friend who knew him in the Dulwich days describes him as slender and fair-haired and grey-eyed, keenly interested in social and political events, and already profoundly convinced that current educational methods were out of adjustment with the needs of our changing times. He went for long walks with this friend, and he talked abundantly. He was very quick and sensitive, and he would express his vivid convictions in the most forcible language. These talks still live in that old friend's memory as very delightful experiences.

In these Dulwich talks Sanderson showed that he had already shaped out the main lines of the conceptions he was to realise at Oundle. Science, he maintained, did not hold the position it should in modern education, nevertheless he would not give it undue prominence; the main object should be to discover and develop any natural

ability that a boy might possess, whether classical, mathematical, historical, literary, or scientific; in teaching, the method of research should as far as possible be adopted; boys and even quite young children should be allowed to discover things for themselves. Though convinced that language and literature must always form the basis of education, he held that science properly taught supplied something that could be obtained in no other way, and that its introduction into the general school curriculum was necessary not only on this account, but also because the application of science to industry had brought about such a tremendous change in social conditions during the past hundred years.

He had, says this friend, the courage of his convictions. One day his son Roy was walking backwards towards a rocking-horse, Sanderson refused to interfere in spite of the coming tumble. The child had to learn to look round and not to trust to the intervention of others. Better to tumble where he could come to no great harm and so learn his lesson.

A keen young man, fierce to hold his convictions intact, resolute to maintain them, expecting opposition and braced for opposition: such, we think, was the effect of Sanderson at his coming into the little world of Oundle. He was appointed as a fighting man. It is on record that one of the governors who selected him said at the time: 'We have got the very man, sincere, strong and capable. If any one can pick up the tone of the school, he will do it.'

This was Sanderson in his bracing morning time. Most of the memories of those who write of him now are of his genial afternoon. And most of this book, too, is to tell of his afternoon, to tell not so much of how he came to be, but what he was when most of his battles had been fought and his teaching had shaped into its most characteristic forms.

§ 7

Here follows an account of the old Oundle and the new by an old boy who had peculiar opportunities of judging both aspects of the school. It will fill in various gaps in the outline of the story we have told in the preceding sections.

'The Oundle at which I was educated,' writes this contributor, 'was very different from the Oundle of Sanderson, at least in its final stage. The headmaster of my time—the Rev. St. John Reade—an Oxford man and former Captain of the Oxford Eleven, had come to a sleepy little country grammar school, which, after a brief awaking under a previous head, Dr. Stansbury, had again relapsed into rustic somnolence. A big influx of pupils followed Reade's appointment, for which the little old low-roofed school-room with its two miniature class-rooms was quite unable to provide accommodation. The dining-rooms and common-rooms of School House and Day class had to be freely utilised, and their cookshop atmosphere on a hot, stuffy afternoon will always remain redolent in my memory. Even that was insufficient, and all sorts of odd premises were commandeered up and down the town, notably the Workmen's Club, a singularly gloomy building, and the block of offices next the Boston & Spalding Bank (long since swallowed up by one of the large Banking octopuses). The boarding-houses, full to overflowing, took on various annexes, such as the Red House and others, and finally an additional house, Sidney, was started in buildings now occupied by New House.

'Some sort of extension was imperative. Unfortunately the governors, instead of going outside and building on land they had already acquired, on which the present Laxton-cum-Crosby block stands, clung to the town. They

THE TALBOT STUDIES

first built the fine New School behind the old School House of my day, that has now been converted into engineering shops, and as they possessed a narrow strip of land facing it across the road, they planted on this cramped and awkward site the new School House, flanked on either side by an inn. The *surgentia moenia* of this new habitation I beheld indeed, but it was completed after my departure. It was one of Sanderson's greatest achievements to persuade his governors later to rectify their previous error at a considerable cost by acquiring and demolishing the surrounding buildings, setting back the picturesque windows of the old inn, to form the front of a new range of studies, while on the ground cleared on the north side the new School Hall was erected. Sanderson was as firm a believer as Thring in the influence of " the mighty wall," or " spaciousness " as he termed it.

' The school in my day, if I remember aright, numbered over two hundred ; but comparatively small as the numbers then were, there was an almost uninterrupted stream of scholarship successes at Cambridge, of which the most notable were those of Banton (7th classic) and Simpson (9th classic). This was due to the wonderful teaching of R. P. Brereton, for twenty-six years chief classical master. He was trained in the school of Shillito, and his master-passion for Latin elegiacs and Greek iambics fired many of his pupils, whose best efforts were rewarded by being copied into a book that bore the title " Inscribatur," which, to some of us at least, seemed a foretaste of immortality. In his last year, under Sanderson, five boys won open scholarships for classics and all subsequently obtained " firsts " in the tripos at Cambridge, a splendid record for a school of this size. Very few boys went to Oxford, but one of the seniors of my time, H. D. Leigh, gained the chief scholarship at New College, becoming

subsequently a tutor of Corpus College. Some of his success, no doubt, was due to the headmaster, who was not only a fine scholar but had also a love for English literature which, unlike other Heads of the time, he communicated to many. But in other subjects in which the school was afterwards to become famous, such as Science or Mathematics, we certainly did not shine. The ambition of most ceased with the acquisition of enough Mathematics to pass the "additionals" at Cambridge, and Science, or "stinks" as it was then called, had only a very precarious footing. It must be admitted that the chief master in these subjects was a favourite subject for ragging by the Upper boys, with much justification, I think, since as a teacher he was dull as ditch-water. I am not sure if the memory of certain hours of boredom is not more persistent than that of the most poignant hours of pain :—the colours are not so vivid, but they appear to be "fast."

'Modern Languages were well taught—a rare thing in those days—but the principal master was an Englishman, who was not "taking any," as I speedily ascertained on my arrival, having come from a school where we called the master "Froggie" to his face, thereby eliciting from him an English that was even more execrable than our French. The text-book was no other than the famous Ollendorff, and unable to take the requisite interest in the hat of my aunt or the top-hat of my uncle, I, on the advice of the master, who thought poorly of me, gave up the study of the language.

'Years afterwards, having become a modern language specialist, I came down to examine the school for the Joint Board in Modern Languages and just missed by a year the exquisite pleasure of inspecting the Modern Language teacher who had marked my papers "N.G."

'As for games, we played cricket and had our sports on

what is now the town's field, a mere pocket-handkerchief compared with the present spacious campus. Football we played on a ground below the headmaster's town house, when it was not under water. Otherwise we played on a rough field, all hills and holes, at present occupied by those Siamese twins, Laxton and Crosby.

'I left at the same time as Reade, who retired to his family estate to die soon after. Then followed two brief reigns, of which there is little to be told, and when Sanderson was appointed the numbers had fallen to less than half the total of Reade's best days.

'My first acquaintance with Sanderson dates from the time I went back to inspect the school. By that time he had overcome the opposition he had encountered from some of the older members of the staff. He had, so to say, played himself in, and his chief interest seemed to lie in the development of the engineering and scientific side, without however neglecting the other studies. I examined practically the whole school in Modern Languages, and though much excellent work was done at the top, the engineering side, as far as I could judge, appeared to be run rather too much on technical lines, the research ideal, although already there, being subordinated to the acquisition of the craft, and the engineering boys gave one the idea that in some forms French was regarded rather as "trimmings" than as a real part of the school studies. At the same time Sanderson struck me very forcibly as an experimenter, but a cautious one. He looked, in fact, on external examinations and inspections as a most important means of control for any innovations he might be attempting. The experiment must justify itself by tangible "results," of which examinations provided one kind of test. Not that he was ever a seeker after results for show or advertisement.

Nothing was further from his thoughts. He looked on them not as an end but as a means of verification, a rough barometer or index of the soundness of his schemes.

'When I next saw him, he seemed to me (I speak from memory, always a somewhat treacherous thing) to have firmly rooted in his mind the truth that boys, broadly speaking, fall in certain broad groups or categories. There is the boy of the abstract type of mind, whether literary or mathematical, and again the boy of the concrete type with constructional or with artistic abilities. For each of these there was provided a complete course, whether in Classics, Modern Languages, Engineering, or even in some cases in Music. These courses were a no mere conglomerate of subjects, but carefully thought out curricula.

'But his was a mind of the infinite progression type. He went forward slowly (securing his ground like a good general as he went along), but the effect was like that of a steam-roller, which if slow and deliberate, pulverises everything in its path and leaves a broad and ever-growing track behind it. He more and more began to see if you are to fire the average English boy's imagination (and no education that fails to do this can be called an education) that you must start him with the concrete, and again, after establishing broad types of education for groups of boys of different gifts and abilities, he saw that these again were divisible into smaller and smaller groups, till he arrived at last at the individual boy (when exactly I do not know), but then he saw that the real problem was not that of creating different courses to suit different types, but of *reversing the process* and taking the boy himself for his starting point and trying to devise for him and those like him the appropriate curriculum. In a word, he no longer looked on education in terms of Latin, or Greek, or Science, or Mathematics, but of the individual boy. That

was nothing short of a revolution, but in this case Sanderson made it successful by providing a staff sufficient to cope with the enormous new demands on it.

'But this tendency to make the curriculum for each ever more and more elastic, was only the counterpart of a parallel transformation his ideas were undergoing towards making the subject studied more and more an object of research instead of acquisition. He did not want to deck-load the boy with knowledge, but rather fit him out as "well-found" and seaworthy for the voyage of life. His aim was in fact to produce creative not possessive types, to use Bertrand Russell's phrase.

'I saw him again shortly after the outbreak of the war, which had evidently crystallised his ideas on the supreme value of research as alike the best means for training pupils in the use of the tools of knowledge and as the chief incentive to learning, while the making of munitions (which the school took up) confirmed him in the belief of the value of co-operation and "team work." He had not given up the main "cadres" of training, classical, mathematical, engineering, etc., but only made them more elastic. In fact he had added to them by developing the biological, botanical, and agriculture side with a view to catering more directly for the boy with naturalist and observational gifts. Moreover, the work had brought into prominence in his mind the spiritual concept, that all work is really service.

'When I saw him again, his ideas had once more widened and broadened, especially in the direction of "things spiritual." No doubt the loss of his son in the war had been a factor in the mellowing and ripening of his strong and varied character, that ripening which Goethe described as everything. The idea of service had expanded, and to him now the school was to be a mirror and model to the nation, and indeed to the world, a veritable fulcrum for the

uplift of humanity. He had reduced to a fine art his system of grouping and regrouping boys year by year according to their aptitude ; special courses were provided for supposed hopeless or dull boys. But the main " cadres" were still there, though all sorts of subsidiary subjects were introduced into them, *i.e.* biology for classical boys, etc. Research was extended or to be extended to all subjects. In fact, he did me the honour on this occasion to ask me to attend a staff meeting with a view to extending it to Modern Languages. In addition, it was no longer directed towards the investigation of the mere subject under study. It took on a social and sociological bias. Education for livelihood was absorbed and transcended by the burning desire for an education for complete living. Life was really an adventure, and love the end of its quest, with " live dangerously " as its motto. Sanderson aimed indeed at nothing less than the creation of a new order of knights-errant who should save Society by reorganising it.

' Only a week before his death I was staying at Oundle, and in the long talk we had together this Philosopher of Change (as I could call him) adumbrated further reforms he was proposing, or indeed had already started, of which I will mention only one—the abolition of all punishment. In his early days he had been a firm believer in the rod, but he had long given up the practice ; his prefects (so they told him) had also done so. I was rather incredulous, but I found later that even when it existed elsewhere in the school, it had been reduced to a minimum. Boys were expected to make good by doing a piece of useful work. The whole theory opens immense vistas which one cannot discuss here.

' Sanderson had always great difficulty in expressing himself and his ideas, partly, I believe, because he at the outset, from his leaning to mechanics and the exact sciences,

largely thought in mechanical language. The theological training he had received no doubt encouraged this bias, since many of its terms are direct translations of the mechanistic terminology of the mediaeval theologians, who turned the dynamic and vital terms of the Greek fathers into static and mechanical phraseology. But the *élan vital*, the life spirit was so strong in Sanderson, it finally broke through this hard-shelled phraseology, helped no doubt by the ever-increasing interest he took in such vital sciences as Biology and Sociology, and it is noteworthy that the whole of his University College lecture, which in many ways may be regarded as his last will and testament, is saturated with vital and biological conceptions.'

§ 8

Let a later pupil of the middle phase of Sanderson's career at Oundle now tell an anecdote or so of the Head. This boy was the dear son of his mother, and she came to Oundle at first with a certain jealousy of the new personality which would so largely replace her own influence. The youngster was what most schoolmasters would recognise as a 'difficult' type, rather big for his age, a 'handful,' emotional, enthusiastic, potentially mulish. His first interview with the Head concerned a certain fortnight's work rather scantily done. 'I pleaded I was top of the form. "Competitive success, my boy, is no measure of the value of work done, no measure at all. Do it again, my boy, do it again—*as well as you can.*"' A first lesson on the true spirit of Oundle.

'The school workshops at that time were for the first time being left open to the boys. They went in as they pleased. It was one of Sanderson's endless experiments in trusting his boys. Chemicals, tools, and apparatus were left available out of school hours, and one was led to suppose

that a blind eye was turned to their use even at prohibited times such as Sundays. The most dangerous chemicals were of course removed, but enough was left about to disturb the equanimity of other masters, who had less faith than the Head in that providence which looks after youth.

'I was doing some work one day and found myself wanting to hammer a rivet upon something. I found a large surface plate, an extremely accurate and expensive item of equipment, and in my zeal it seemed to me the very thing on which to hammer a rivet. When I had done the surface plate registered my vigour in some appreciative indentations. That did disconcert the Head for a little when it was discovered. But my punishment was quite Oundelian. I had to make a study of the manufacture and use of surface plates and bring a report and explain it all to him. And after that I found I had learnt to look twice at a fine piece of work before I used it ill.

'I was not the only enterprising spirit in those days. And also there was some skylarking and enough damage and confusion for the Head to lose faith for a time. The open shop experiment was stopped; the laboratories and workshops were locked up except at hours when there was organised supervision. This stopped the skylarking element and the loafing, but it was felt very acutely by a number of boys who had found this free work under free conditions a very delightful privilege. It is possible to study the manufacture and use of other apparatus than surface plates, and now a small body of us got to work upon the structure of locks, the picking of locks, and the use of skeleton keys. In our enthusiasm we made skeleton keys for all Oundle, not only for the laboratories but for private rooms as well. For weeks we used the laboratories and workshops as we had grown accustomed to use them, but now with a keen care of the expensive

apparatus and with precautions to leave nothing disorderly to betray our visits. It seemed that the Head saw nothing; he had a great gift for assuming blindness—until Speech Day came round, and then we were amazed to hear him, as he beamed upon the assembled parents, telling them the whole business, "And what do you think my boys have been doing now?"

'He loved initiative. I believe he was really sorry to suppress a telephone exchange we had installed in School House largely to make his visits less unexpected. Removal of the wires was decreed, but, I more than suspect, in hope that some more ingenious scheme would be evolved.

'It may seem, from the above instance, that Sanderson's methods depended largely on initiative which might be dangerous to discipline. Such instances are naturally more vividly imprinted in a boy's memory, than those hundreds of other times when his kindly interest both in ordinary school work and in research work provided an inspiration which might otherwise have been lacking. In the mechanical laboratory investigation of an original kind always commanded his interest, and more than once when the resources of the available apparatus were exhausted these were supplemented in a way which would have been impossible without his keen personal co-operation.

'Slovenliness and lack of keenness were qualities he could least abide. I remember being severely dealt with for writing some indifferent and quite unoriginal, though otherwise adequate notes on one of his Scripture lessons, but on another occasion when I had frankly omitted to do any work, not having written a single line, the offence was passed over. He was surprisingly tolerant of failure at uncongenial subjects if he saw that a great measure of interest and vitality were diverted to some other objective, even though it was not in the curriculum.

'One cannot describe one's relations with the headmaster without calling to mind the great assistance which was always given by Mrs. Sanderson's sympathy. I remember once for a period I greatly disappointed the Head. There was a loss of sympathy which I felt very deeply, and was therefore the more loath to acknowledge. It resulted in my adopting a "difficult" attitude. I made myself detestable and detested doing so and couldn't see any way out of it. One evening Mrs. Sanderson fell into talk with me, told me of her regret at my behaviour, helped me by hinting at difficulties even in a headmaster's life, and asked me for the sake of the school to be more helpful to him. It was quite a new light for me and my stubbornness melted at once into an eager helpfulness.

'One other memory I must tell. Most enterprising boys I suppose pass through a phase of nocturnal wandering. With me it took the form of wandering down into the library and working in the small hours. There the Head found me at two o'clock one morning. I suppose he had been unable to sleep and had got up to wander round. He was astonished and exceedingly angry when he found me, scolded me hotly and made me feel the full gravity of such a breach of discipline. The thunderstorm passed. "And what are you reading, my boy, at this hour?" I told him of the work that had taken possession of me, work for which the day time was all too full. Yes, yes, he understood that. He looked over the notes I had been taking and they set his mind going. He sat down beside me to read them. They dealt with the development of metallurgical processes and he began to talk to me of discovery and the values of discovery, the incessant reaching out of men towards knowledge and power, the significance of this desire to know and make and what we in the school were doing in that process. We talked, he talked for nearly an hour in that still

nocturnal room. It was one of the greatest, most formative hours in my life. . . .

'"Go back to bed, my boy. We must find some time for you in the day for this. . . ."'

§ 9

Very recent accounts of incidents in the school life of Oundle have been difficult to get. There were very few 'rows' and no school trials in the later years, and there were no expulsions. Now and then a new boy would drop out after a term or so, and it would be felt rather than known that his people had been told he would do better elsewhere. There was, however, a little 'rebellion' so late as Armistice night 1918. That was a queer day throughout all England; everywhere there was a sort of ghastly rejoicing; guns, factory hooters, church bells spread the news that the great wastage of the war was at last at an end. Work ceased from Land's End to John o' Groats and people went about in aimless crowds. The boys expected an instant holiday. But the Head found it hard to rejoice and triumph over the collapse of any nation. The school had suffered a long list of casualties, masters and old boys and boys. The Head's eldest son had been killed quite recently; it had been a terrible loss to Mrs. Sanderson, and the boy's widow was also in School House. The Head was in no 'Mafficking' mood. He said nothing. After school hours were over a few boys set themselves to organise a procession and burlesque illuminations and firework displays. They went about the little town, waving flags and making noises. Their demonstrations culminated in a gathering outside School House where they sang soldier songs and patriotic songs.

'At last the Head came out and stood on the steps of School House and looked at us. We stopped singing.

Everybody shut up. He stood looking at us and nobody said anything. "Go to your houses, boys, now. Go to your houses," he said at last.'

The boys went. That was all. There was no inquiry, no punishment. The rebels realised they had done an ungracious thing, alien to the spirit of the school, and that was punishment enough.

# CHAPTER THE FOURTH

## METHODS AND EXPERIMENT IN OUNDLE SCHOOL

### § 1. The Classical Side in Oundle School

AND now, having, we trust, given the reader some conception of Sanderson's personality and the general atmosphere of the ancient school he had revived, we will give a series of papers by various hands, upon the more or less distinctive methods of Oundle. Mostly these notes are by his colleagues and assistants in the school. There is necessarily a certain amount of repetition and overlap in these papers and they will not all be of equal interest to every reader. They repeat one theme with variations in terms of mechanics, history, music, and the like. We would suggest, therefore, that for a great number of readers this chapter is to be selected from rather than read steadfastly through. In Chapter the Fifth Sanderson himself will begin to speak and explain his views, and he will discover himself more and more fully to the reader up to the end of the book.

His treatment of the Classics has first to be considered. We have to remember that the school as it came to him was a school still maintaining a high tradition of classical scholarship, and with a venerated tradition of achievement in formal mathematics. An atmosphere of intellectual dulness was not incompatible with success in classical examinations; the number of scholarships

gained would have done credit to a larger school. He came into the school with no proposal to reverse or destroy what Oundle had done in the past; his mission was to add and extend. He was no classical scholar, and to begin with he was rather concerned with the weeds and wilderness than with the surviving patches of cultivation. He had no illusions about scholarship; he did not confuse it either with education or knowledge; he knew that a man can be a good scholar and ill-educated just as he can be well-educated and no scholar at all. But he knew also that the care and fine finish of scholarship is a thoroughly good thing and he did not intend it to die out of the school. The vacation reading parties in the 'Lakes,' which were mentioned in our second chapter, were primarily arranged for the benefit of scholarship and army candidates. They were, says a competent observer, entirely successful. They gave the 'brilliant individual' just the scope he could not find in the more co-operative methods that began presently to dominate even the classical and literary work during the term.

Gradually the ideas of service as distinguished from possessiveness and individual accomplishment, that were being developed upon the science and engineering side, spread into the classical and literary work. The work was more and more directed towards knowledge and understanding, and less and less towards style and the achievement of quotable sentences and a stereotyped if elegant phraseology. History, ethnology, archaeology and sociology came in to mitigate the grammatical study of Greek. Says one of his classical assistants:

'The headmaster's attitude to the classical work of the Lower Fifth was primarily one of hostility to "commentaries." He expected active burrowing into the meaning

of the written word by the Form, and " live " sentences for Composition. He regarded Latin as the study of a great civilising agency, and was intolerant of the epigrammatic type of brain which he declared was the result of the stylistic teaching of the Classics. He always laid more emphasis on the duty of the Roman " parcere subjectis " than " debellare superbos," and was continually urging one to give a rest to the literature of warfare and to study the lives and thoughts of the Romans in relation to their position as engineers and guardians of the Pax Romana.

' His attitudes to English and to Latin literature were closely parallel. During many conversations which I had with the headmaster on the subject of teaching English he urged the study of that part of the literature which was a vehicle of living thought rather than a historical study of the great English classics. The element of surprise and freshness was in his opinion essential, together with an attempt to solve problems which had not previously been tackled. He held that a boy's interest should have something personal in it, and for that reason he was anxious that the subject " read in " Form should be subjected to specialised and individual treatment in the library, where a boy could follow his own bent, and, if a draughtsman, illustrate his work by a chart or drawing.

' With regard both to the Classics and English the headmaster's view was that the pursuit of knowledge should be a pleasurable unfolding rather than an acquisition of hard facts—hence the course of study and the system of teaching should be elastic and varied. Not that he despised such acquisition; there were times when he emphasised before the whole school the need of assimilating hard facts and even of learning them by heart, but as a means and not as an end. He supported his demand for versatility and freshness with an invincible conviction that both the class

and the teacher would be able to respond to the heavy and continuous strain that such a method entailed. In fact his conversations with the staff on these points ended almost always with a chuckle of delight on his part that such work was very interesting " and most deadly difficult.". . .'

' In English,' says another of the staff, ' I remember him discussing the difference of teaching Ruskin and Shakespeare. He favoured Ruskin or any such " uncharted " author, for this reason, that with no notes or prescribed-for-examination ready-made opinions, a boy was obliged to think. Ruskin, the Head considered particularly good as stimulating thought because of his controversial opinions ; he did not mind that less tangible results were obtained in examinations on such more difficult books ; Shakespeare papers brought in more marks only because the boy parroted a cut and dried and universally accepted opinion. For such work—for such a personal search for truth at *first* hand as the study of Ruskin demanded—the Library was of course to be used.'

' I am not able to give the headmaster's ideas on the tactical details of teaching Classics and English to the lower forms,' writes another colleague from the classical side, ' for the simple reason that he was essentially a strategist in education, who, having selected his subordinates, left the tactical direction entirely to them, almost without discussion. I cannot recall his ever suggesting to me a Latin or English text, or a particular method of presentation, or his ever criticising a choice of mine. He seemed to me to be absolutely free himself from " idées fixes," and to welcome any method or piece of teaching which approved itself to him as alive and stimulating.

' I can remember discussing the " direct method " of teaching Latin in my interview with him previous to my

appointment. I gathered that he was sceptical, and inclined to regard its use by all and sundry as mere new-fangled flummery, though in the hands of a few capable enthusiasts it could be very stimulating and therefore of great educational value. But for the Latin teaching of a low form I should say he did not think it either necessary or desirable to devise methods for evading a steady "grind" at the elements of grammar and syntax.

'He permitted distinctly experimental choices in English texts, never objecting that a book was too modern or too advanced to be suitable. In fact, for a book to be rather above the heads of the form for whom it was being proposed, helped to commend it to him, because it appealed to his principle that a boy's reach should be beyond his grasp (or what 's a form-master for ?). He attached great importance to his own method of repetition in the study of plays, and experience of working that method confirms his high valuation of it.

'He favoured the teaching of Industrial History to young boys, holding that the story of economic development, the story of men's tools and inventions and productive devices, came nearer home to boys, and was more concrete and alive to them than political abstractions, or even than the eccentricities of the great men of history. I think he had it in mind to try an elementary course of Economics with a comparatively low form, which would provide working illustrations of the broad principles of that science.'

## § 2. The Workshops and Engineering Laboratory in Oundle School

We have told how as an assistant at Dulwich Sanderson first came to realise the value of applied science in seizing upon the interest of boys for whom the stereotyped classical

course had no appeal. For some years the scope of his work in practical science was restricted to this limited class, and in the meantime he was occupied with the provision of similar work for the same type of boy in mathematics, mathematics mitigated by reality. But there is little doubt that very early he had begun to feel the cramping influence of traditional school science with ' its meticulous performance of *elementary* experiments, dearly venerated in schools.' As he himself put it, ' science teaching too often begins (where we hope the teaching of languages has made a finish) in a drilling by means of the elements, the grammar of science.' The need for a fuller use of the creative life of science presented itself more and more insistently to his mind, and the last ten years saw him more than ever concerned with the development of this end.

His experiments with applied science as an educational medium brought him to the conviction that here was the means ready to hand of lifting science teaching generally to a higher plane. It became a general rule, though not a law of the Medes and Persians, that all boys should begin physical science by a consideration of the principles as they revealed themselves in their applications. There was to be none of that slavish adherence to the logical development of the subject still generally in favour, but, on the other hand, the work was not to become technical, in the narrow sense of the term, and so lose its value as an educational medium. In short, practical problems were to lead the boy to the study of principles, and, more than that, they were to open up new avenues of work leading to the wider pastures of research and discovery. Applied science, he held, was complex and apparently difficult ; yet it had romance and mystery which appealed to youth. Moreover, it was in direct contact with the ordinary life, the home life of the day. It was always progressing ; there was less induce-

METAL SHOPS

ment to become conventional and stagnant and to fall a prey to stereotyped methods than there was in the study of general principles only. It had substance about it and was full of information which was sought after, and it was always suggestive and stimulating to the curiosity.

As in all other parts of the school, he was actuated by the desire to give every boy, no matter how humble his talents might appear, the opportunity of which, he was convinced, the boy was only too anxious to avail himself. There was no intention of making this side of the school a nursery for future engineers, and no one who knew his work could maintain that his was merely a great Scientific and Engineering School. Though perhaps it is yet too early to appraise fully his work in this connection, the methods would appear to have justified themselves to an extraordinary degree with a very large majority of boys. Very many boys—an exceptionally large percentage—have proceeded to the Universities, and it is perhaps permissible to meet some criticisms which appear to present themselves to the academic type of mind. Thus Professor Armstrong remarked, in a letter to the *Times Educational Supplement* [1] in a critical appreciation of Sanderson, that ' boys from his school were full of enthusiasm and keen workers when they came to college, but they had insufficient knowledge of fundamentals, they were, in fact, undisciplined ; it was very difficult to lead them back to drink at the springs and make them logical.' This is the comment of a stylist rather than a discoverer. What are these springs ? Has science grown by a logical process or by experiment and criticism ? Does the mind grow by logical steps or is not logic rather a late classification ? It must be remembered that these boys of whom Professor Armstrong wrote, included amongst them many who would have appeared utterly incapable,

[1] July 22, 1922.

under any other system, of contemplating three or four years' further study with hope and love, much less of reaching the standard necessary for such a prospect. Sanderson would have felt that to have inspired enthusiasm (and what tribute could be more magnificent than this ?) was ample justification of his work, and he would have asked if it were certain that such boys were being led back to the springs and not to a stagnant pool.

As so far developed—and it must be remembered that Sanderson was always moving on—the general system at Oundle is somewhat as follows:—Boys of fifteen years begin with an almost entirely experimental course of an informal character, extremely elastic in its details, in which fullest use is made of their intuitive knowledge. This is limited to one or two hours per week and the experiments are mainly in elementary Applied Mechanics. At this stage the main object is that the boy shall learn to ' do things ' and to take pleasure in the doing. He will not necessarily have a whole year at this work—in two terms out of the three he may have been introduced to the chemical, biological or geological laboratories. At any rate, he will be exercising his faculties and developing his powers of observation in some form of practical science.

In the following year he is introduced to pure Physics and Mechanics treated in much the same way. After this he begins a serious course of Applied Physics and Mechanics in which the standard aimed at approximates to that of the ' first School examination.'

In Heat the steam and gas engines form the basis of instruction, and among other things steam engines of about 10 h.-p. and gas engines of 30 h.-p., oil engine and turbine, are used for experimental work. These are fitted for a variety of tests, including indicator diagram, steam or gas consumption, output on brake or electrical motor, trans-

mitted h.-p., etc. Tests are made on calorific values of fuel, both coal and gas, and at the same time many of the typical laboratory experiments of the more orthodox courses are performed when they may be useful in supplementing or illustrating this practical work in the engine room.

In Electricity the work is confined mainly to a study of the phenomena of current electricity and magnetism so far as is required for an understanding of the former; Electrostatics is postponed till a much later stage.

Typical syllabuses which have been accepted by the Oxford and Cambridge Schools Examination Board for School Certificate are appended.

### Applied Heat

1. Work, mechanical equivalent.
2. Sensible heat, latent heat.
   Heat of combustion of coal and coal gas.
3. Properties of steam; meaning and use of steam tables.
   Connection between temperature and pressure.
   Dryness fraction.
4. Indicator diagram.
   Brake power. $B=AI+b$.
   Action of valves, simple valve setting.
5. Theoretical indicator diagram of steam and gas engines.
   Efficiency.
   Expansive working, compound and triple expansion.
6. Gas engine, petrol engine.
   Discussion of 4-stroke and 2-stroke cycles.
7. Radiation from boiler. Conduction. Expansion.

### Electricity

Magnetic fields, lines of force, intensity.
Comparison of fields by magnetometer.
Electromagnet.
Magnetic phenomena accompanying flow of current.
Field of straight and coiled circuits.
Measurement of current strength.
Electrochemical equivalent.
Ammeters. Tangent galvanometer.

Voltage and power.
Ohm's law.
Power lost in transmission.
Ammeter shunts. Extension of voltmeter range.
Wheatstone bridge, Post-Office box.
Potentiometer.
Principle of electric bell, induction coil, telephone.
Dynamo and motor—simple points in connection with commutator, lamination, field windings, etc.

MECHANICS

(*a*) Graphic Statics.

Three or more forces at a point.
Parallel forces.
Moments.
Funicular polygons.
Cantilever, crane, roof principal.
Warren and N-girder.

(*b*) Strength of materials. Tension, compression, torsion. Experiments with testing machines.
(*c*) Force, work, energy, horse-power, efficiency of engines. Energy in fly-wheel, dynamometers and brakes.
(*d*) Machines for transmitting and transforming energy (shafting, gearing, pulley tackles, etc.).
Friction.
(*e*) Motion in a circle. Governors.

By this time the boy will have reached the age of sixteen and a half to seventeen and a half years and his future work depends on a careful scrutiny of his individual capacities. Many boys are now transferred to forms in which the work is directed on more or less conventional lines though still with a distinct bias towards the 'Applied.' This Sanderson frankly regarded as 'tool sharpening'—a kind of periodic 'fettling up' of the contents of the tool-box in contradistinction to the grinding of a tool as it is required in the course of a job. Other boys may carry on with their Applied Science to the standard of the Higher Certificate, wherein the scope and extent of the work is

increased so that the boy has surveyed at least the whole of the ground commonly regarded as the domain of school work.

It would probably be of little interest to pursue further the details of this side of Sanderson's work—its general development follows on the same lines with increasing freedom and elasticity—the minutest consideration of individual boys, so that all might find something they could do and do well, and in the doing be led along paths converging on the common highway of ' service.'

In the workshop again Sanderson insisted on the same principle, that boys come to school ' not to learn but to do,' and it is impossible to dissociate Workshops from Applied Science in a review of his work. It was not that he deliberately co-ordinated the two. In his later years particularly he detested the word, or rather the visions that it called up. His experience was that such co-ordination was only too apt to produce an artificiality which more than counterbalanced any benefits it might be expected to yield. Co-ordination was blessed only in so far as it was natural or spontaneous. It was far from Sanderson's mind that watertight compartments should exist, but workshops were not to be the handmaid of other parts of the school. They were to be a thing in themselves, real, alive, the ' home of creativeness.' There are many points of contact between them and other parts of the school, and full advantage of such points of contact was to be taken. But the primary object of the workshop was to give boys the opportunity to do constructive work and so develop their growth in that direction. Along with this there were other objects to be attained, incidental maybe, but for many boys highly important. In the type of workshops he had in mind and towards which he had already made considerable progress in the developments at Oundle, there was to be work of

sufficient variety (and an equipment of machines to cope with it) to give the boys an insight into the chief difficulties and the possibilities of modern industrial life, and so enlist the sympathies of many future ' captains of industry ' in the welfare of the workman.

The workshops were started in a very humble way in Sanderson's early days with one lathe and a few benches for woodwork. Extensions were made at intervals, but for a time the work proceeded on conventional lines. It was not until 1905 that Sanderson saw his way to any radical changes of method. In that year an opportunity was afforded by Mr. Hunter of the North-Eastern Marine Engineering Works which profoundly influenced the future of the workshops. Mr. Hunter supplied castings and drawings for a 6 h.-p. reversing engine designed for a marine engine of about 3500 h.-p. The whole of the machining and erection was done by the boys in the shops, and the work was a triumphant success. Where the equipment was insufficient to cope with the work new machines were obtained, and so the real development of the workshops began. A similar engine was built in the following year, and later an electric motor was built and used for driving the main shafting. This is still in use and gives excellent service.

The outbreak of the war found the shops furnished with sufficient plant to undertake a variety of munition work, and from January 1915 the workshops were fully engaged in this way. For the first two years boys worked in shifts, one set working in morning school and after a long interval carrying on again from about 5 P.M. to 7 P.M., and a second set filling in the afternoon and the evening from 7.30 to 9.30 P.M. Later it was found necessary to revise the system of working, and the plan was adopted of sending in a whole form for a week at a time. This arrangement

seemed so satisfactory that it has been retained, and thus each boy now gets a whole week each term either in metal shop, foundry, smithy, or wood shop.

The requirements of munition work gave an immediate justification for the extension of the workshops. Several new machines were obtained and the woodwork was transferred to another building, thus more than doubling the capacity of the workshops. The work done included—

1. Brass finishing for Messrs. Peter Brotherhood, in connection with torpedo gear, submarines, etc.; over 12,000 parts being done.
2. Tools for Woolwich Arsenal—draw punches, clamp screws, nuts, punch holders, etc., for which 32,000 bars of steel were used.
3. Nearly 1400 horse shoes and 1200 timber dogs for the Munitions Board.
4. Bed screens, etc.

The extent and variety of experience thus gained left Sanderson more than ever convinced of the prime importance of constructive work for the community as opposed to exercise work for so-called instructional purposes, and after the war, efforts were continually directed to the development of this aim.

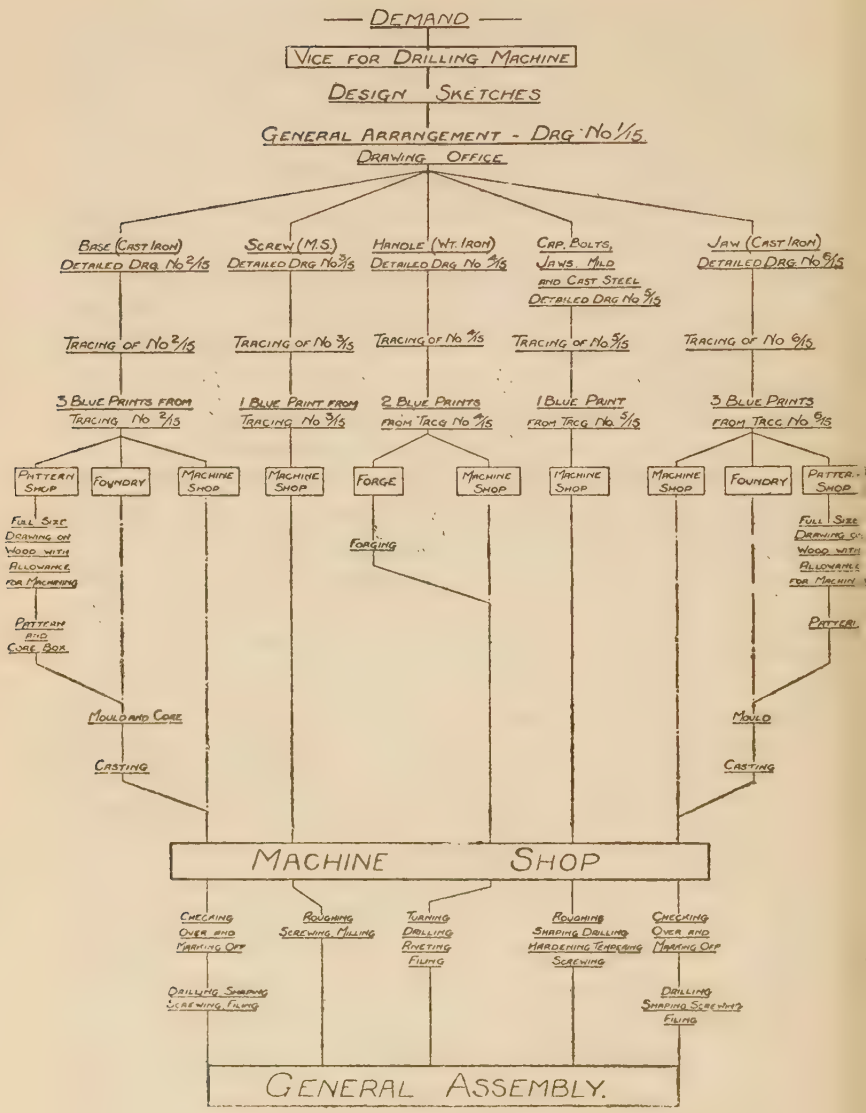
A renewed attack was made in 1920 on this problem, and six additional instructors were appointed. Noticeably in the case of the smithy an abundance of work was provided by the requirements of the farmers of the district; in the other workshops there was much to be done both in metal and in woodwork to develop the resources of the various laboratories and to meet the demands for furniture from school and boarding-houses. The work undertaken by the boys is so chosen that, whilst helping to meet these needs, it introduces as many as possible of the essential operations

of the crafts. With careful organisation no difficulty has been found in providing work of sufficiently varied character to allow for the different levels of attainment reached by boys of different ages. Throughout, a high standard of accuracy is aimed at ; in the metal workshops much of the work involves the use of micrometer or of limit gauges. In general, many operations are required before a job is finished. In some cases all or most of them may be carried through by one boy, but frequently the work passes from hand to hand, or from one shop to another until it reaches the finished state. In the latter event the fact that each boy is a unit in a team working with one object in view helps to secure and maintain the highest standard of workmanship at each stage. Where necessary an individual operation may be practised as a preliminary exercise, but only in so far as it is required for the satisfactory completion of the job which demands it. As the same operations naturally recur many times in work of varying degrees of complexity, it is usually found that such practice is unnecessary with most boys, and the same purpose is achieved without loss of interest and incentive with its consequent indifferent workmanship. Many competent judges have expressed their astonishment at the character of the work done, which seems to show need for revision of the commonly accepted standards of what is possible for schoolboys.

As the work in the metal shops progressed in this last phase, it became obvious that a Foundry was essential to the life of the shops. The practical support of a few friends of the school prepared the way and the Foundry was completed in 1921, giving further impetus to the work and adding enormously to the resources of the school. The gain in the interest and scope of the work cannot be overestimated. It has brought about a close but entirely

natural co-ordination of the activities of the different shops, and from this point of view alone—quite regardless of the intrinsic interest and value of the work done there—has proved itself invaluable. In illustration of this point, amongst others, a study of the accompanying chart may be of interest. This was drawn up in order to reveal to the school something of Sanderson's conception of unity of purpose—' team work,' ' co-operation.' Incidentally it gives an illustration of the possibility of providing the type of work he wanted from within the school ; the vice referred to was required in the course of the development of equipment in the workshops. Other examples of work already done are appended—the list is by no means exhaustive ; it contains only a few representative examples.

It is clear that work of this kind requires careful organisation in view of its variety and the large number of boys—often some fifty or sixty at a time—occupied with it. It has been found advisable to keep a card index in which are recorded the nature of each boy's work, the main operations and the standard reached in performance. Further, the various jobs are analysed so as to show the principal operations involved, the order of accuracy required, and the degree of difficulty to be expected. Preparations are made well in advance—preferably at least a term ahead, though sufficient elasticity must be maintained to allow jobs of some urgency to be dealt with—and a wide variety of work must be arranged. It is true that it is not the kind of organisation which can readily be reduced to writing in terms of formal syllabuses, but it is difficult to see how Professor Armstrong's contention can be sustained that it ' fails to teach the boys to know and respect their tools.' It was Sanderson's firm conviction that it did all this and more, it went some way towards giving them the vision to use their tools.


DEMAND
VICE FOR DRILLING MACHINE
DESIGN SKETCHES
GENERAL ARRANGEMENT - DRG No 1/15
DRAWING OFFICE
BASE (CAST IRON) DETAILED DRG No 2/15
SCREW (M.S.) DETAILED DRG No 3/15
HANDLE (WT. IRON) DETAILED DRG No 4/15
CAP, BOLTS, JAWS, MILD AND CAST STEEL DETAILED DRG No 5/15
JAW (CAST IRON) DETAILED DRG No 6/15
TRACING OF No 2/15
TRACING OF No 3/15
TRACING OF No 4/15
TRACING OF No 5/15
TRACING OF No 6/15
3 BLUE PRINTS FROM TRACING No 2/15
1 BLUE PRINT FROM TRACING No 3/15
2 BLUE PRINTS FROM TRACG No 4/15
1 BLUE PRINT FROM TRCG No 5/15
3 BLUE PRINTS FROM TRCG No 6/15
PATTERN SHOP
FOUNDRY
MACHINE SHOP
MACHINE SHOP
FORGE
MACHINE SHOP
MACHINE SHOP
MACHINE SHOP
FOUNDRY
PATTERN SHOP
FULL SIZE DRAWING ON WOOD WITH ALLOWANCE FOR MACHINING
FORGING
PATTERN AND CORE BOX
MOULD AND CORE
CASTING
MOULD
CASTING
MACHINE SHOP
CHECKING OVER AND MARKING OFF
ROUGHING SCREWING, MILLING
TURNING DRILLING RIVETING FILING
ROUGHING SHAPING DRILLING HARDENING TEMPERING SCREWING
CHECKING OVER AND MARKING OFF
DRILLING SHAPING SCREWING FILING
DRILLING SHAPING SCREWING FILING
GENERAL ASSEMBLY.

## WORK ACTUALLY DONE AT OUNDLE

The list is meant to be merely suggestive. Many items should of course appear under more than one head.

### Machine Shop

| *Work Done* | *Destination* |
|---|---|
| Rolling mill | Metallurgical laboratory. |
| Machine vice | Metal workshop. |
| Viscosity apparatus | Senior Physical laboratory. |
| Screw jacks | Engineering laboratory. |
| Surface plates | Metal workshop. |
| Repairs to microscopes (racks) | Biological laboratory. |
| Machining of moulding boxes | Foundry. |
| Limit gauges | Metal workshop. |
| Overhaul of steam engines (Working under a mechanic.) | Engineering laboratory. |

### Foundry

| | |
|---|---|
| Moulding boxes | Foundry. |
| Grates and firebars | Metallurgical laboratory and boarding-houses. |
| Wheel for wheelbarrow | Farm. |
| Piston for small gas engine | Engineering laboratory. |
| Bases and jaws for vices | Metal workshop. |
| Block planes | Wood workshop. |

### Forge

| | |
|---|---|
| Repairs to agricultural machines | Farms (school and private). |
| Horse shoeing | Farms (school and private). |
| Clamps | Physical laboratories. |

### Carpenter's Shop

| | |
|---|---|
| Wheelbarrows | Experimental farm. |
| Dining-room tables | Boarding-houses. |
| Large cabinet for gramophone records | Music room. |
| Study desks with bookcases | Boarding-houses. |
| Plane tables for surveying | Mathematical department. |

CARPENTER'S SHOP—(*continued*)

| *Work done* | *Destination* |
|---|---|
| Benches | Workshop equipment. |
| Large blackboard on stand with folding leaves for projection work | Drawing office. |
| Steps and ladders | Boarding-houses. |
| Burette stands | Chemical laboratory. |

PATTERN MAKER'S SHOP

| | |
|---|---|
| Bracket for milling machine | Metal workshop. |
| Base for retort stands | Laboratories. |
| Piston for small engine | Engineering laboratory. |
| Stand for rolling mill | Metallurgical laboratory. |
| Moulding boxes | Foundry. |
| Machine vices | Metal workshop. |

## § 3. MATHEMATICS IN OUNDLE SCHOOL

Mathematics occupies a special position in Sanderson's work at Oundle, partly because it was his own subject, but more because ideas of teaching mathematics have been transformed during recent years. In this reform he was a leader, a bold experimenter and yet never the unbalanced revolutionary. It is quite a mistake to think, because he did so much for science, that this subject was in any way peculiar in his ideals of education. It may fairly be said that the only reason for his advancement of the claims of science as a school subject was the opportunity it gave him to widen the scope of education. He found a large field of knowledge wholly neglected, and had the courage and the faith to make it the basis of the education of a large part of his school. But he did not want to specialise in science at the expense of anything else. What he did for science he set out to do in all subjects, that is, to find how to get the best out of them for each individual. Least of all were his aims technical. He did not teach engineering to train

engineers or science to make scientific workers. He put boys to these subjects because their abilities or tastes showed that only by them could their powers find their proper field. Every kind of work was to go on so that each individual might be put where he could be a true student and an enthusiastic worker.

In this account of mathematics at the school we shall show how he applied his principles to a subject already recognised as essential. Sanderson was himself a Wrangler, and he taught mathematics for some years at Cambridge and later at Dulwich in connection with engineering and science. We can trace the underlying influence of this early training throughout his career. He never lost his conviction of the necessity for a real mathematical basis for physics and engineering ; his earliest efforts were directed to equip his boys with a sound and sufficiently advanced knowledge on which their science might be built. Very early in these experiments he arrived at the conclusion that mathematics for science alone was unfruitful. He would have the subject stand on its own merits : he did not want it in a subordinate position. Its connection with other subjects and its services to them could be turned to good account, but its intrinsic value was its real justification.

He found the ordinary teaching of mathematics narrow, stylistic, unambitious, hedged in by the artificialities which so rapidly grow round a self-centred subject and entirely oblivious of the swift progress of the scientific world. Knowing that science and mathematics have always made their great advances by mutual assistance he wanted to bring that co-operation into school teaching. There is in Mechanics and Physics an endless supply of material for mathematical instruction far more interesting than the common text-book examples, and this could be used

without making mathematics a mere appendage of science or sacrificing its individuality.

He felt that much had been lost by restricting schemes to elementary work, so that only the ablest boys could reach a standard sufficiently advanced to make real use of their knowledge. Hence he aimed at widening the scheme for all boys and getting them on to what had been regarded as 'advanced' at the earliest possible stage. The laborious practice of rudimentary work and strict theory makes too great a demand on the patience of a beginner. He wished the boys to see first the purpose of it all so that they might have an intelligent interest.

It is entirely misleading to call Sanderson a revolutionary. It was never his practice to pull down before he was ready to rebuild. All his reforms came gradually, each step tested and verified before venturing on the next. Every advance was carefully thought out, but he never stopped. This is the secret of his great accomplishment—untiring industry as well as bold imagination. It carried him much ahead of contemporary opinion. Men who did not see his patient experimental labour sometimes regarded him as an unpractical dreamer. Certainly he did indulge in dreams and would at times talk of them, but he had also an uncanny power of bringing them to reality—often only after years of reflection. When he made up his mind he took the necessary step boldly, but never so as to destroy anything which had life in it. 'The old is good,' he would say, even when proposing a new departure.

In the early days at Oundle he found mathematics a separate and very restricted subject and science almost non-existent. With the creation of a real science side began on parallel lines the development of mathematics. He found boys working out purely technical examples and

learning propositions practically by heart without a thought of their meaning or use. It is even recorded that a whole class could write out a certain proposition perfectly but could not draw the figure because ' they had not learnt that yet.' Trigonometry, Calculus, and Mechanics were definitely out of the reach of any ordinary boy. All this he set himself to alter, working sometimes under great difficulties. He had to show that his new methods would not jeopardise the boy's chances in examinations, which in those days were entirely out of sympathy with his views. A good deal of the credit for the improved nature of public examinations is due to him.

In the year 1899 Sanderson published a little book called *Geometry for Young Beginners*. A somewhat detailed examination of this book is necessary because it shows the germ of many of the ideas carried out more fully at a later date. It appeared at a period when reform in mathematical teaching was being discussed. It shows that his ideas were much in advance of the time. In his preface he says he is writing for pupils from the age of eight upwards. Its purposes are :

(1) To familiarise the use of instruments.
(2) To serve as an introduction to Euclid.
(3) To supply geometrical facts.
(4) To facilitate the solution of riders.
(5) To indicate a rational method for geometrical drawing.

It will be seen that he wants children to study geometry at the earliest possible age—a principle he applied to all mathematics ; also that he does not wish to get rid of Euclid. He never wished to lose the real substance of Euclid's Geometry. At a later period his opposition to it was due to the abuses with which it became surrounded.

He found a tendency to crystallise geometry into learning propositions in endless succession ; such teaching he called ' dead ' and was prepared to eradicate by drastic methods. His third purpose is particularly typical. He did not believe in rationing knowledge : the first requisite in anything was to get a wealth of material, not perhaps very tidily classified and catalogued but abundant and inspiring. He did not care how a boy found out the sum of the angles of a triangle, or how to prove the angle in a semicircle is a right angle, so long as he knew it as a fact and a useful fact. But let us consider his book.

He begins with the simplest experimental drawing, suited to the age of the youngest, with the object of familiarising them with such things as angle, right angle, perpendicular, parallel. Definitions appear as the summary of experience, not as the starting point. The facts about parallels are to be learnt from the use of set squares—they are not to be accepted on authority or even to depend on verification. He wishes them to appear naturally by experience, holding that the way into immature minds is through intelligent practice and not through talking. But he avoids an error into which several other reformers fall. They propose to have a preliminary course of drawing before introducing any geometrical reasoning. This he regards as misleading. Although it is obvious that a little drawing saves much talking about properties of figures (for purposes of definition) he does not go far before making some attempt at geometrical proof. The sum of the angles of a triangle is found first by trial, but the boy is immediately led to see that there is a reason for it. There is no formal proposition, but he seizes the opportunity to begin upon the foundations of geometrical science. The reasons given in these informal proofs are not always those which fit best into a logical scheme, but this is to him of no importance so

long as he can teach the first great lesson : geometry is no series of isolated facts, but an organic growth with its parts mutually sustaining one another. It is easy to criticise the book in the light of more recent experience. For instance, the examples might have been more varied and some of the explanations more direct, but we must remember it was in its day a new departure.

The general scheme on which this geometry was written he applied to all his mathematical teaching. It used to be regarded as the test of mathematical promise to set a beginner to surmount the ' Pons asinorum.' Those who failed were condemned to wait and waste their time till they could be dragged over it. This is directly contrary to Sanderson's principles. He pointed out the absurdity of expecting logical power to come before experience and refused to have anything of the nature of a bar to mathematical progress. Though this particular difficulty was perhaps often avoided by other teachers at this time, there were very few who did not make the same mistake in other cases—either they would have a complete logical system or none at all. He believed logical power would grow if allowed to do so at its natural rate, and in the meanwhile material could be collected, ready to fit into its place when the time was ripe.

It is a natural corollary from his theories that he should prefer (for beginners) direct numerical application to theoretical proofs. The very perfection of form in which Euclid (and most of his imitators) presents geometry is an obstacle to the ordinary boy's comprehension. This was the problem which he faced, and his manner of dealing with it was to put in the foreground the principal facts and to use them numerically. This is not to say that he attached no value to logical treatment. On the contrary, his whole object was to lead up to a real grasp of the reasoning process

of geometry. Only in the case of the 'obvious' propositions did he refuse to bother with proofs. The parallel line difficulty, congruent triangles, the equality of opposite angles between intersecting lines he thought waste of time. It is curious to find that these are the very things modern research suggests ought not to be 'proved' because they are not necessarily (or even probably) true. Geometry is after all, at its base, an experimental science. There is plenty of material for logical training in its later stages. He felt that anything fixed, rigid in shape and unable to expand was lifeless, and that dead things could never give life. The acceptance of authority—even such an authority as Euclid or Newton—closed the boy's mental outlook. He wanted the spirit of inquiry, of independence. At one of the certificate examinations an examiner stated—apparently as a criticism—that the boys all proved a proposition in different ways. Sanderson was delighted : here was evidence of independence and individual taste. He was ready to fight the established order whenever it appeared to suggest to boys that there was nothing left to be done. At times he felt it necessary to exaggerate to make his object clear, and once went so far as to forbid any teaching of propositions ; but he certainly never meant to abolish geometrical reasoning.

He could not always find the means of expressing himself. His tendency to take an extreme line in talking about his intentions was partly due to this weakness and partly a policy. He felt that a great effort was required to get out of a rut, a thing which he dreaded more than anything else. The effect was sometimes bewildering, but those who tried to sympathise with his aims always found in the end that he had a perfectly practical object to attain.

He did not like imitation of other schools, always preferring to solve his problems for himself and fit them to the

atmosphere of his own school. A few years after the little *Geometry* appeared he began to experiment with revised schemes of geometry for older boys. These he had printed for private use in the school—a continuous experimental process. Ultimately he decided to expand the original book to meet the needs of all boys up to the time of reaching Sixth Form standard. Here he made some considerable changes; one is so typical of him that it deserves special mention.

Pythagoras' Theorem is generally deferred to the stage at which a proof can be given. He took the wider view that it is the result which is important for education, and therefore brought it in quite early without proof to be used in numerical applications. The object of these notes is to state Sanderson's views and not to express opinions, but we cannot refrain from mentioning the unexpected success of this apparently insignificant step. It opened at once to little boys a host of interesting uses for geometry and made possible the use of algebra and arithmetic to investigate the properties of figures. They found at once a justification for their expenditure of time on geometry, that you can do by mathematical processes easily and accurately things that would otherwise entail cumbersome drawing and measurement. It is hardly necessary to say what a stimulus this gives.

It is not necessary to describe in detail Sanderson's views on the teaching of algebra because they are the natural complement of his ideas on geometry. He would discourage starting with complex 'simplifications' and removal of brackets in order to get to realities at once. Always at a meeting of mathematical masters he would get his thoughts on the smallest boys or the weakest set, and often spend the whole time over their difficulties. He would get a sheet of paper and put down something like

'the area of an oblong with sides $a$, $b$ inches is $ab$ sq. inches.

1. Find the area when $a=2$, $b=3$.
2. If the area is 12 and $a=3$, what is $b$ ?
3.
4.'

He never worked out the details—that he left to his masters. The vacant 3, 4 . . ., lines are typical, for he wanted the initiative and invention of his staff. He talked over and round the subject, not to dictate but always aiming to stimulate confidence and originality. A systematic course of algebra did not appeal to him. He would plunge boldly into practical problems and teach the methods when they were wanted. He knew quite well that algebra is a technical study for which much practice is necessary, but he would like his boys to find out this necessity first, so that they should work willingly at the routine examples for a purpose clearly understood.

Numerical Trigonometry is at last becoming generally recognised as a valuable part of early mathematical training. He made this discovery and applied it in practice many years ago. Always impatient of attempts to cut mathematics into separate 'subjects,' he knew the value of a little foretaste of trigonometry introduced incidentally in awakening interest. He was never afraid of discounting future work by anticipation, because there is always a fresh light to be thrown on a known method. The school possesses a valuable theodolite : he wanted the little boys to see and handle it. A makeshift apparatus could be tolerated as a rough model, but he believed that the real thing had to be familiar if the full value of its lesson was to be obtained. He did the same with all apparatus. The best instrument, designed for real work, was the only thing

of any use for teaching, and it must not be kept under a glass shade. All the apparatus was actually used by the boys, not merely demonstrated. This policy did not prove so expensive in repairs as one might expect, because in spite of occasional accidents boys acquire a respect for an instrument of real use. In any case he would not supply anything to be kept away from the boys : that would be to him a pure waste of money.

Any scheme or schedule of work was always vague, a mere outline or suggestion ; the last thing he wished was to restrict his masters. Rather he wanted them always to be experimenting in new directions. He encouraged them even with junior sets to attempt logarithms and to introduce slide rules. He did not like his masters to shrink from trying a suggested new course. If, after trial, they found it unsatisfactory he was always willing that they should try something else. He wanted each man to find his own way. It was part of his plan that each set should have an individuality of its own, so that as boys passed up the school they should find variety. One of his first principles in rearranging the sets was that no boy should stop too long with one master.

The Headmaster's control of the teaching of the school was very real but never oppressive. He made it his business to know what was being done everywhere, and suggest something to try or encourage the work he found going on. While his initiative is to be traced in every department he left all practical details to be settled by each man according to his own judgment. The result was that every one felt he had a free hand. Whatever a master wished he might try without risk of disapproval. All that was asked of him was life to impart to his class. If the result was disappointing in appearance the headmaster would never blame the master : he would never admit that a real devoted effort

could be a complete failure. Its results would appear sooner or later.

Reliance on text-books was what he most disliked. He would have the work made to fit the needs of the school, and for this purpose he printed, in the form of small pamphlets, sets of examples or problems specially devised for its use. Such things can be varied or supplemented as need arises, so that there is always a fresh supply coming in to keep the whole alive. Still more did he like to see boys supplied with hectographed copies of work set specially for them.

He always had a feeling that purely elementary mathematics is of very limited value, and he aimed to give as many boys as possible the much wider outlook which comes from Co-ordinate Geometry and the Calculus. Like all his reforms, it came gradually. There has been a gradual extension downwards of the sets in which they were to be started. Experience showed the parts of these subjects and the method of treatment suitable for beginners. Long before the majority of schools had discovered the calculus for average boys he had passed the experimental stage. The difficulty had been again connected with logical rigour. The beginner in the calculus cannot be expected to grasp the subtleties of the meaning of 'limits,' but, said Sanderson in effect, he can see the general drift of the argument if it is presented colloquially and we can then pass on to the application. At a later stage we can discuss the fundamental logical problems when we have some experience to illustrate their meaning. There is considerable difference of opinion among mathematical masters on this point, and this is not the place to argue it. All that we need say is that over half a school of 500 boys have been able to make something out of a subject till recently reserved for specialists. He had ideas which he put into concrete form for conic sections. He drew up a scheme of several different

ways of starting the study of the parabola—the focus and directrix method, the method by starting with the equation, the dynamical method from the path of a projectile. He did not attempt a systematic course because time would not permit of it. What he wanted was to give the ordinary boy some idea of the curve and its properties. This again he had printed. The aim was always width of outlook and a general comprehension of what mathematics means.

But he had another equally important purpose. Not only in mathematics and science, but in every part of school life he believed that boys learn a great deal that is not directly taught. He counted on this, and provided every opportunity for it. This is the meaning of his policy of covering the walls with architectural photographs, filling the Art Room with great pictures, putting real apparatus in the laboratories, carrying on skilled work in the shops, holding the scientific and literary conversaziones, encouraging lectures and debates, and the host of activities described in other chapters. We may call it the ' indirect ' method of teaching. The same principle was applied to mathematics. A boy may be nominally working at the calculus, but he is necessarily at the same time getting the best possible practice in algebra, graphs, trigonometry. Elementary trigonometry appears as a new and interesting study to a little boy : he does not know that it is largely a lesson in algebra or arithmetic in disguise. Applied mechanics must make continual demands on elementary mathematics. We can rely on these advanced subjects to bring in or suggest all the elementary revision we want. There can be little doubt that his success as a teacher and headmaster is largely due to this policy. It is the precise opposite of over-organisation, of elaborate schemes defining exactly what a boy should learn at each stage, and exactly what should be kept from him. This is the day of widely

advertised educational devices. Sanderson never attempted to reduce his methods to a system neatly labelled and boomed as a cure for all school troubles. That would have destroyed the spirit of freedom : he did not want another labour-saving device, but only opportunity for masters and boys to find a wider field of service. Nevertheless, Sanderson's ' indirect ' method may yet be rediscovered and given to the world as a new and epoch-making system.

As for difficulties of organisation, in so far as that means minute subdivision of teaching material, he never allowed them to trouble him. Often he would speak with amusement of headmasters and others who wanted to know how to ' co-ordinate ' science and mathematics, meaning apparently how to cut them up into sections for various members of the staff, and how to avoid ' overlapping.' He could never answer these questions because he wanted overlapping ; he wanted the science man to use mathematics and the mathematician to trespass on the scientific preserve. When boys find the one in close contact with the other, they see the facts from a new point of view and realise that knowledge is a whole. This is why he thought all mathematical men should take some science and why he made science men take many of the mathematical sets.

In mechanics, Sanderson's teaching developed steadily on bold and vigorous lines. In the early days he started with simple experiments and ' Statics and Dynamics ' of the mathematical text-book. At this time he did a good deal of teaching himself. He had a remarkable power of finding the right way of making principles clear. Instead of taking a succession of examples on one principle, he preferred to deal with a real machine and use all the methods of mechanics as they arose in its discussion. He would spend a whole lesson on the various problems arising, for

example, from the movement of a train—the horse-power required on the level, up a hill, the acceleration, the power developed in the cylinders and so on.

Centrifugal force he regarded as a reality, that is to say, he took the engineer's view rather than the pure mathematician's. He appreciated the fundamental nature of energy in dynamical theory, feeling that too much stress had been laid on 'force': he said that energy is the raw material of real mechanics. It is energy that we have on tap in the workshop. Force is only 'work per foot.' In both these respects he was working in the direction of the most modern theories. 'Newtonian dynamics needs rewriting,' he would say. It is being rewritten. The theory of relativity, and particularly its effect on philosophical thought, greatly fascinated him.

In later years he began to feel that Mechanics, as then taught, did not get sufficiently into contact with reality. He found boys left school with no real knowledge of its great practical applications. To develop this knowledge was the object of his great scheme of Applied Mechanics. He supplied large engines, testing machines, pulley tackle capable of dealing with half a ton for boys to handle instead of toy pulleys or levers. There was no necessary 'grounding in principles' before they used them, because he was sure that class-room work would teach these concurrently and more effectively by reason of the knowledge of real machines used in the laboratories. This work was generally done in forms, partly for convenience of organisation, and partly because the grouping of boys for pure mathematics is not always suitable for mechanics. During one term of the year, time to treat the more mathematical aspect has been found, and found effective for revision.

Laboratory work in mathematics is now done in many schools. Sanderson always felt that a division between

mathematics and science would impoverish both, and he did not see any advantage in cutting off a specific part of practical work for which mathematical masters should be responsible. Such a scheme can easily result in wasting boys' time over futilities, such as measuring the circumference of a circle. He had, however, a definite idea of the use of a laboratory in mathematics. A number of pieces of apparatus (all different) were kept ready set up in order that a mathematical class might go in to take measurements and work out results. This is, in effect, to let the boys supply their own examples. A card of instructions is all that is required. For example, measurements of a jet of water are to be taken. From these the speed under various heads is to be found by means of given formulae. No attempt is made to explain the scientific laws: the object is merely to apply mathematics to a concrete example. If, as often happens, some knowledge of theory is picked up 'indirectly,' this is all to the good. He delighted to give little boys real apparatus to play with. He put boys of eleven to study a big lifting tackle 'to see how many times stronger it makes you.' Whatever the master did, he was not to teach in the laboratory. A dozen identical pieces of rough apparatus he would not have. Often he insisted on the importance of having the experiments all different so that the variety might excite interest. He knew also the temptation to an over-conscientious master to explain everything first and thereby ruin the lesson by elaborate instruction: with a dozen different things going on the boys are thrown on their own resources.

Another special device which was wholly his invention is what he called 'Continuous Mathematics.' He was never satisfied with the name, but the thing itself proved surprisingly successful. Above all things he dreaded to have mathematics getting in a rut. Nothing is more fatally easy

than to follow a text-book page by page, keeping within the bounds of a fixed ' course,' and nothing more deadly to the master and his class. Give a boy a book full of examples, which he knows he is destined to plough through at a prescribed rate, and he loses all sense of adventure and discovery. The text-book is necessary, but there is no life in following it. Its purpose is to supplement deficiencies and help in difficulty. In ' Continuous Mathematics ' the avowed purpose is not to learn methods but to put them to practical use. Much will be learnt incidentally, but the interest is to be found in the inquiry itself. Some subject of general interest is taken to which mathematical methods may be applied, and the class acting together is to produce a general report on it. What the subject is to be is for the master to choose. He will draw up a rough programme, to be modified or extended at the suggestion of the boys. One master might choose a study of a gas engine. He will provide a set of data from experiment—the result of a brake test, the consumption of gas, the flow of water for cooling, the dimensions of piston, fly-wheel, etc. With these numerous inquiries can be conducted. The weights of various parts, the compression ratio, efficiency, and so on, provide material for small groups of boys who have each responsibility for dealing with a part of the problem. A new airship is launched and certain data are published. The boys can find the lifting power, the cost of gas, the economical radius, and work out to some extent the commercial side of the question. A motor bicycle race suggests many problems in mechanics. Problems in economics are continually before us. It is important that boys should think about the nation's material welfare and understand that mathematics has a service to render even here. The water supply of a great town is in danger on account of drought. From given data we may find the number of

gallons required per day, the time the supply will last, the effect of rationing and so on—all questions of interest and all requiring mathematical processes. Sometimes we may want a method outside the boy's knowledge. At the moment the difficulty can be overcome by giving a formula or other help. When we return to regular work the incident supplies the incentive to learn how this particular difficulty may be met. Even boys with little natural interest work hard at ' continuous.' They know they are doing something, not for themselves alone, which gives an essential job to each, and which is intrinsically useful, while they are free from the oppressive tyranny of competition and marks. The master's share requires initiative. The ideal is that he should evolve his own problems, and he has a free hand to do so, or to take a printed outline and expand it as he likes. If the preparation of a new problem means hard work, he may find compensation in the relief from teaching and correction and the increased vigour of his class. There is never need for pressure to get boys to do their part. The master can spend his time in getting an individual knowledge of his boys' abilities such as he will never find by routine work.

Sanderson's most strenuous labours were on behalf of the average, and specially the ' dull ' boys. He would never admit the word : if a boy was dull it was because he was being forced in the wrong direction, and he would make endless experiments to find how to get his interest. At the same time he did not neglect obvious talent, but here he felt the problem was easy. He loved to give a clever boy abundant time and material to revel in his special subject. To do this he would spend immense labour over complicated details of organisation ; his extraordinary intuition and memory—he knew every boy by name and had a complete mental picture of his ability and character—alone made it

possible to deal with each individual according to his needs. But if some boy was standing still and showing no sign of life, he would adopt any expedient to get his attention. He would take him from his ordinary work and send him for a week to what he called ' intensive work,' that is, to spend all his time on the weak subject, or get him moved up a set or two. It was not enough that the majority should do well. ' I never like to fail with a boy.' He wanted all to ' have life in themselves '—' not one lacking.' These are his own favourite quotations, expressing his conception of a schoolmaster's duty.

### § 4. Physics and Mechanics in Oundle School

In Sanderson's mind the teaching of Physics and Mechanics was closely associated with that of Mathematics on the one hand, and of Applied Physics on the other. Each was complementary to the others ; each had much to give and much to gain. There were no arbitrary boundaries, and Sanderson feared neither overlapping nor the production of a sort of ' no man's land.' He believed that these dangers could be real only as a result of ' a slavish adherence to logic and logical form ' which appears to limit the science of schools to certain elementary work which authority prescribes as fundamental and defines in terms of a syllabus.

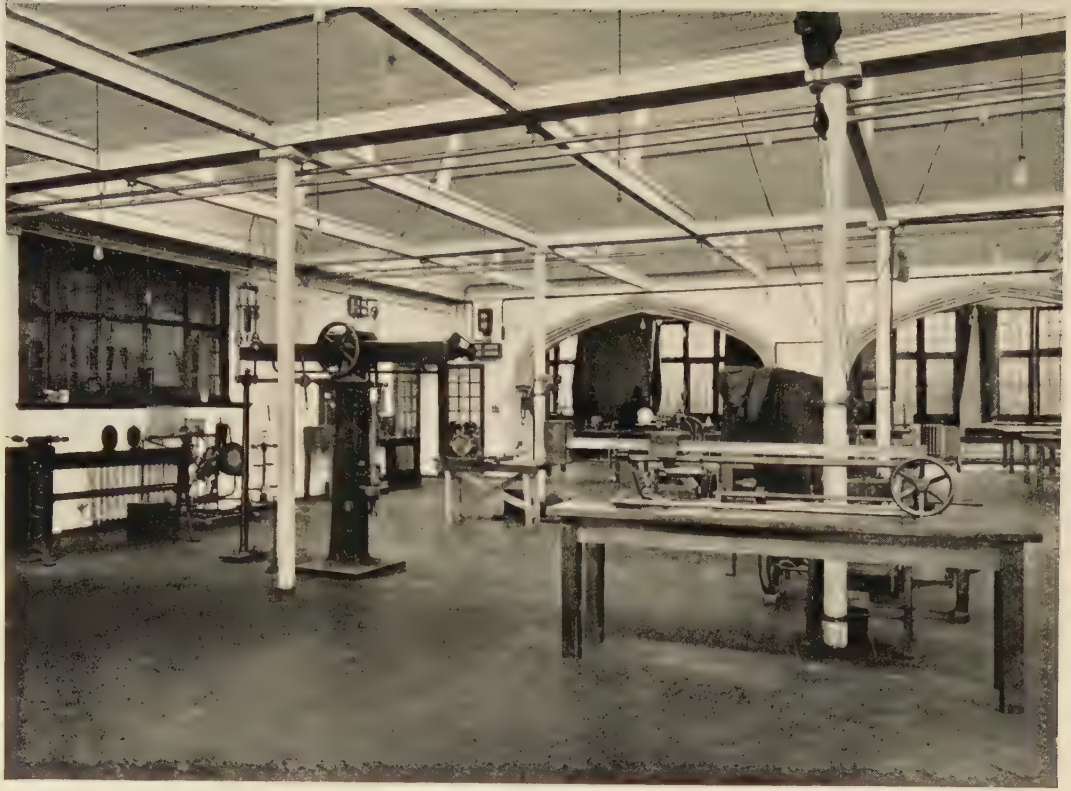
Sanderson had a profound belief in the capacity of boys for much higher work than that of which they are commonly thought capable, and he felt that they could go further afield, not merely without loss but with positive gain to their appreciation of scientific truth. He considered that, at this stage in the march of science, such appreciation could be won better by a first view of the structure which had arisen on the foundations, than by a minute scrutiny of the foundations themselves. He was fond of quoting Boyle's

and Charles' Laws in illustration of his attitude—he held that the time and care devoted in the early stages to the verification of these laws, which after all were only approximations, was better spent in applying them in the study of, say, the gas engine. Later, a boy would come back to them and in the light of Regnault's, Amagat's, and Andrew's researches, would see something of the limitations as well as the general applicability of such ' laws.'

Moreover, Sanderson put the creative stimulus, as he called it, of Science before the development of a logical habit of mind. He felt that the average boy would appreciate better the importance of scientific method if his imagination had first been gripped and his eyes opened by the Romance of Science, and it was for this reason that Applied Science assumed such an important rôle in the work of the school.

Thus he abandoned the traditional courses of Practical Measurement and tried to inculcate the habit of accuracy and attention by workshop operations, where these requirements provided their natural justification. The elements of Science with their so-called verification of fundamental laws, he replaced by Applied Science in which these laws were continually being used. It was not that he failed to appreciate the part that such experimental work had played in the early developments of school science, but he felt that it had outlived its usefulness; that the elaboration of ' elementary ' apparatus with this or that improvement had produced a type of experimental work which had become an end in itself. He says, ' Science teaching must be alive, changing, moving forward. It should not have about it the atmosphere of certainty and finality.'

He had always this consideration before him, and whilst he was developing Applied Science as a preliminary training for the masses, he provided the fullest facilities for the boys



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of more mature experience in the field of Pure Physics. With a keen appreciation of the beauties of instruments of precision and excellence of workmanship, he equipped the laboratories with all kinds of apparatus of the highest order —spectrometers, polarimeters, fluxmeters, potentiometers, standards of resistance, capacity, and the like. Much of this was used in the regular work in school time, and more was available for boys in out-of-school hours. It gave the inspiration for a great deal of work of a semi-research type, leading boys to the study of original authorities and standard works.

Such work, through the medium of the School Science Society and its *Journal*, made a great appeal to many members of the school and produced a steady stream of recruits inspired with a zeal and enthusiasm which could not but react favourably on those with whom they came into contact. In illustration of this feature, reference may be made to the table of contents of the last number, in the press at the time of Sanderson's death, of the *Journal* of the Science Society, where each essay is based on work actually done and in some cases initiated by boys themselves. We have given it at the end of this paper.

Another feature which ranked high in Sanderson's estimation as a source of inspiration was the Scientific Conversazione, a fuller description of which will be found elsewhere. This drew boys from the whole of the upper part of the school, and not infrequently enlisted boys from the classical side. The experiments were of most varied character; many were reproductions of the work of the great pioneers, others illustrated some of the most recent advances. The sources ranged from books such as Tyndall's, to the most recent *Transactions of the Royal Society*; ideas were borrowed from the Christmas lectures of the Royal Institution, from the annual Conversazione of the

Royal Society and the like ; boys were free to make their own suggestions and to try their own ideas.

Sometimes a series of experiments would be included, showing the historical development of some branch of Science, or a set of experiments would be collected together to illustrate phenomena common to several branches. In some cases exhibits would be based on the work done during the year ; in others entirely new ground was broken. Each year a certain amount of new work replaced what had been done before, but no undue stress was placed on this consideration in view of the large number and the variety of the experiments available.

Boys worked in pairs or in small groups, and for a week or more were allowed to devote their whole time both in and out of ordinary school hours to the preparation of their experiments. They found themselves impelled to do much reading of the available authorities, and to study their ordinary text-books with a view to making good the deficiencies in their knowledge.

In the experimental work the boys were thrown very much on their own resources—they devised expedients to overcome little difficulties ; they frequently had to make things to supplement the apparatus available ; they printed descriptive letterpress, made diagrams, sketches, charts, and graphs of results. They were expected to give an account of the work they were doing and to be prepared to answer the questions of any who cared to ask, whether visitors or their schoolfellows.

They were able to go round the different laboratories and exchange ideas with other workers, and they found their own thoughts clarified by the necessity of expounding them to their neighbours.

The work made a great appeal and gave great opportunities, and the response evoked from boys of all manner

of capacities and attainments was no less remarkable than the success achieved. If for no other reason than the incentive it gave to strenuous, painstaking, and patient endeavour, it abundantly justified the labour involved.

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## § 5. PURE SCIENCE IN OUNDLE SCHOOL

Sanderson's gospel of encouraging and providing opportunities for the stretching to the utmost of every individual boy's every power, makes Pure Science teaching at Oundle a strenuous and inspiring thing. Surrounded by an atmosphere of scientific thought and method in all stages and subjects of his school life, a boy's development in Pure Science work is bounded only by his capacity. It was characteristic of Sanderson invariably to hold so high an opinion of a boy's capacity that he regarded it as often operating only in those secret aspirations which every boy keeps hidden in his heart. It is a joy to see the growth of a boy's character and mental development under the stimulation of these unbounded opportunities. With the application of science all round him, in the workshops, the testing room, the foundry, the forge, on the farm and the experimental

plots, the boy feels an irresistible urge to get at the principles of these things, and as he attacks the foundation work of this theoretical side, one can see growing appreciation of the romance and enthusiastic love of the sheer intellectual beauty of science. There is no need for 'discipline' or artificial means of enforcing work. The discipline is self-imposed in the grappling with the difficult problems involved. Entrancing side doors, hitherto unsuspected, open as the boy progresses, and the science section of the Library is ransacked for information on the history of the growth of some fascinating idea. Soon arises the demand for extra practical work in the boy's own time on this point or that, either to repeat some classical experiment or to try out the truth of some original idea produced by the boy's reading. Sanderson hated locked doors and locked-up apparatus. The laboratories are always open, and their resources and those of the workshops are always available, together with the advice and assistance of all members of the staffs. Charts showing the history and growth, the subdivision, the co-ordination with other branches, the bearing on modern life of some branch of science, the foundry, the gas-stripping plant, the coal-tar still, the model coal-gas plant, the wireless installation, the metallurgical laboratory, all produced and mainly built by boys themselves in spare time and in holidays, are permanent examples of these activities. Many of the actual products are not of permanent value to the school and are ultimately scrapped to make room for new workers, but many a boy has found salvation in the opportunity for mind and soul expansion afforded by such work.

Sanderson's idea of science as a means of education was that practically all boys could benefit by the study of Applied Science and the elementary principles on which much of this is based, but he held that not for all the boys

on the Science side was the more advanced study of Pure Science the most suitable means ; so in the upper half of the school we have a series of parallel forms of equal standing, one set doing applied work, Practical Metallurgy, Applied Mechanics and Strength of Materials, Applied Heat, Applied Electricity, Agriculture, Agricultural Engineering and Chemistry, Foundry work, and the other set the more advanced academic side of Chemistry, Physics, Mechanics, Biology.

Although every boy has exceptional opportunities of cultivating his own particular line, yet in all the science forms a large proportion of time is allocated to other subjects, Literature, Economics, History, Modern Languages (French, German, Italian, Spanish, Russian). In arranging the forms, Sanderson's object was to get boys of similar tastes and aspirations in the same set, and then to frame a syllabus of work specially for their requirements. Often there are a few boys whose capacities and work do not fit in with any of the regular forms, and in these cases a set (often very small) is formed with special organisation for their work. Invariably the forms are arranged for the boys, not the boys for the forms. This principle of individual consideration keeps the forms and their work in the upper half of the school in a constant state of flux. A form with an unusual arrangement of subjects arises, serves its purpose for a year or so and then disappears for a time to make room for another arrangement, more suitable for that particular generation. The organisation of such a system demands enormous elasticity of staff, and it was Sanderson's genius and insight, together with his firm faith in this ideal, which made it possible.

Sanderson's love of spaciousness and freedom was exemplified in the laboratories and apparatus provided for this work. He had no use for ' model ' apparatus, specially

designed for school use. Real testing plant and the best and latest type of apparatus, regardless of cost, is provided, and these are not kept as exhibits, but are in daily use by even the smallest boys. It is no small part of the vindication of the Sandersonian ideal that this beautiful apparatus is used by all with prideful respect and care.

Once a year, at least a week is given over to boys carrying out some experiment or series of experiments chosen by themselves. Ostensibly this is in preparation for the Science Conversazione on Commemoration Day, and boys spend weeks and even months in their own time in preparing for and elaborating the experiments they have chosen to perform. During the week the Science Laboratories and the workshops are a hive of feverish activity. Sets of boys acting in self-chosen partnerships are obsessed with the bringing to perfection their own experiment. Failures in producing the desired results occur, often in the early days of the week, the reasons for the failure are eagerly sought, further experiment follows, additional ideas and elaborations spring up in the boys' minds which have to be tried out, further fittings are required which the boys themselves have to make. Boys, whose particular gift is such craft as draughtsmanship or glass blowing, are called on by all and sundry to give a helping hand. All the faculties possessed by all the boys are pooled and are drawn on by any one who requires their use. Criticism, suggestion, advice are sought and given by every one to every one else. The work is co-operation in its fullest sense, and is carried out at the high pressure of eager absorption. All other work is put on one side in the joy of free creativeness. Unexpected and unsuspected talents in individuals are here discovered. Many a boy can trace a vivifying influence on his whole outlook to this particular opportunity. Through all this restless and often impatient activity runs the spirit of Sanderson,

whose views on education it epitomised. For him it was probably the happiest week of the school year.

This Science Conversazione and the other out-of-school work is under the aegis of the School Science Society, which also organised lectures and demonstrations throughout the year, either by men of science outside the school, or oftener by boys themselves. A Science Society *Journal* is published each term, chronicling all this, together with articles written by boys on subjects which they have themselves followed up.

### § 6. Modern Languages in Oundle School

Sanderson was not a linguist. He would often refer to his incapacity in foreign tongues; but he laid a semi-humorous claim to be able to read a scientific work in French or German. He attributed his lack of knowledge largely to the methods by which he was taught: he had, he said, spent most of his time in ploughing through 'wretched little books of Unseens.' He hated 'wretched little books' in general, as significant of 'class-room tyranny' and examination-cramming: boys should have free and independent access to sumptuous, 'spacious' editions of the best authors. A development of this thought will be seen later.

As a writer in *The Times* has said, it was perhaps partly because of his own lack of sureness in languages that he was strongly in favour of their retention, in the curriculum of any school and in the entrance examination for any university, provided they were not compulsory for every candidate: he objected to any compulsory subjects. His encouragement of modern language work was enthusiastic and lavish. Any method or device proposed for popularising, developing, and perfecting the teaching, not only of the French and German, but of Spanish,

Russian, and Italian, he eagerly caught up and helped. Singing classes, lectures, debates, gramophone and dictaphone work, handsomely produced plays, specially compiled phonetic books—all met with his warm support. Until his health became weaker, he never once missed a debate or a *conférence*: he came again and again to rehearsals. His questions were ever alert: what he missed, he asked about: he noted especially the efforts made by young boys to understand and to take part; his delight at seeing a voluntary audience of over three hundred follow, with quite reasonable success, a play or a lecture in French was a joy to those responsible.

His progressive attitude towards the modern language work in general may be roughly divided into three stages. In the earlier days, when he was building up the school, he was a martinet for thoroughness on what may be called modern examination lines. He instituted a carefully arranged series of fortnightly tests—still continued—which kept grammar, prose, and translation up to the mark; and he keenly watched and criticised the results. As with other subjects, he made a probably unparalleled proportion of the boys take the Certificates of the Oxford and Cambridge Board, entering many who had no chance of success, and using the examinations as a general school test rather than as a means of acquiring diplomas.

The next period dates from perhaps twelve or fourteen years before his death. The 'Direct Method,' with certain modifications, now made a strong appeal to him: conversational and phonetic methods, ever changing and being discarded for new, were put into practice. It is in this period that many of the teaching devices mentioned before, aiming at accent and fluency, were developed.

Lastly came the essentially Sandersonian and revolutionary idea that all preceding aims had been largely wrong.

Why should we worry a boy to write a correct 'prose,' or to elude grammatical catches, even when the latter are contained in 'sensible' sentences—as opposed to the ancient or Ollendorffian inquiries as to pens, ink, and paper? Nay, the sacred 'Direct Method' itself was wrong in its conception: it aimed at making an English boy a passable imitation of a French boy, at enabling him to buy his railway ticket or order his lunch in France without rendering himself conspicuous. Where lay the Service to Man in all this? The purpose of learning living tongues was to give access to, and mastery of 'live' Books: books of racial and social development; books of advanced and progressive thought. No stop must be made at even the wide range of languages already attempted—the staff of a school should include specialists in the tongues of the Near East, of the Far East, of Africa. The method to be adopted was that of the co-operative library work already in full swing, with History and English. A noble building must arise, with at least one wing sumptuously equipped as a modern language 'House'—in the *New Atlantis* sense: a literary research laboratory devoted to the abstraction and collection of the writings of great foreign Men of Service.

There would always be boys of real literary and linguistic aptitude whose tastes would lie in the direction of the study of language for its own sake. These should have as free a course in the older methods and ways as the others in the new. The 'House' would be primarily intended for those boys—in a majority at Oundle—whose minds were of a scientific or historical bent.

Less adventurous opinion was not slow in indicating to Sanderson the obvious difficulties in the way. His Library and Research method was indeed in full and successful swing in other departments, even with quite young boys. But there the medium of work was the mother tongue.

How was it possible for a boy with a less than rudimentary acquaintance with a foreign language to disentangle advanced argument in that language—argument he could barely comprehend in his own ? The teacher, whose task in the English research work was that of a general adviser and organiser, would be kept running from one pupil to another at every fresh complication of vocabulary or syntax or style : meanwhile, the boy would lose the thread. An ordinary ' Unseen ' (hated word) from Michelet, Taine, Jaurès, or Sorel will worry a boy for half an hour : how then expect him to be interested and happy with these authors in the bulk ? Once again, in the choice of books, could it not be said at least, in favour of the accepted or ' classical ' writers who figure in examination syllabuses, that they teach what the essential France or Germany really mean ? Was it not desirable to realise, say in La Fontaine and Molière, that the soul and even the civilisation of our neighbours are entirely different from our own, before attempting to study the latest economic theories of a restricted and untypical number of Frenchmen or Germans ? In English, yes, well and good : the boy is himself probably a typical Englishman, and may start from the point that he knows his own outlook on life. But surely not with another language, expressing another race ?

Sanderson admitted that the age of commencement must be much later than with English work, and that a younger boy must be initiated to the ' Library habit ' by means of first arousing his interest in books which he can tackle, more or less. For this purpose a large number of popular stories of adventure, tales of the war, travel-books, and fairy tales and magazines were obtained, and nearly every boy of middle-school development was given a period weekly for unrestricted reading therein. A room was improvised specially for this purpose, as awaiting the Temple

or ' House ' to come later. At the same time, the ' live ' books were imported from the Library into this room, and a start was made with two or three classes of older boys of scientific and engineering turn of mind in work of a historical-economic character. A much more restricted and easy syllabus for research was suggested than would have been attempted in English : it consisted only of various simple aspects and phases of the Napoleonic period.

Both with the Juniors and with the Seniors the experiment had hardly been tried sufficiently to render possible an estimate of its success when our headmaster died. It can be said, however, that in some cases we found reason for hope : that the junior books at least were eagerly looked at, and—with help—fairly well understood ; and that the spirit of co-operation was being developed not only in the research work pure and simple, but (and this was an eminently Sandersonian touch) by certain older boys giving freely of their time to reading the junior books and to making marginal vocabularies of the difficult words in aid of the younger generation. We found opportunity now and then to put a few of the best linguistic boys on to research work—those for whom it was not specially designed, and whose tastes were naturally linguistic. To these it was practically child's-play, excellent results being obtained at almost a moment's notice.

It must be left to the future to reveal how far it is advisable or possible to continue Sanderson's thought. As has been said before, he realised that the entirely preparatory or ' tool-sharpening ' period must, in the case of a foreign tongue, be much more protracted than in English, and that it must necessarily continue simultaneously with the research. Moreover, the power to talk with educated Frenchmen and Germans was not to be despised. But first and foremost, in the present stage of world-develop-

ment, he placed the power of understanding and spreading the thoughts contained in the books in which the greatest foreign servants of mankind have recorded their deeds and their visions.

## § 7. Music in Oundle School

Any one who had the privilege of frequent conversations with our late headmaster on various educational problems, must have been impressed with a certain unity of aim, and method, which guided all his efforts. In all subjects, and by every available means, he made it his object to extend to all boys under his care the opportunity of mental and spiritual enlightenment which too often has been reserved for a select few. When he spoke on one of his favourite texts about the ' life ' and ' abundance '—' I came that ye should have life and that ye should have it more abundantly '—and he was constantly preaching on this—he meant much more than vigorous exercise of mind and body. He was thinking also of the great treasures of art and science which have been inaccessible to the multitude owing to lack of opportunity. He wished to fill the school with everything that could interest and inspire, so that no germ of life, mental or spiritual, in any boy, should perish for lack of a suitable soil.

His attitude to music differed in no way from his attitude to everything else, and there can hardly be a better example of his genius, because in music he had great personal difficulties. He could not himself appreciate music; frequently he said ' he could not hear the organ.' Yet he would hear with other people's ears ; he knew that it was a great force and he was determined to have all he could made out of it for the school. He often regretted his inability to ' hear ' and to understand music, and said he

thought he could have appreciated music had he had some early training ; but at any rate no boy here should lack an opportunity.

First of all he saw the opportunity in the School Chapel services. Every boy should be required to sing in every part of the service. Probably he was aware that a certain small percentage of people can never hope to get very near a tune, but he knew also that inertia or shyness would soon cut down the singers to a small choir if he once admitted inability. Hence he enforced his principle day by day ; even to the end he would complain to the school if they were feeble or careless over the singing. He took away the excuse of the ' non-choir ' by providing every one with the music which at any time was sung in the services ; the ' non-choir ' was required to sing alone at the school practices and occasionally alone in the services. The effect, from a musical point of view, is much better than one would expect. If one happens to be close to the wrong boy it is not pleasant, but at a little distance, where one hears the whole mass singing, it is surprisingly impressive.

How is one to learn to do anything ? The headmaster always gave the same answer, ' by doing it.' He meant boys to learn to read music by having continually in front of them the music they were singing. With the opportunity would come a little knowledge, then some interest, and later real appreciation and enjoyment. Some boys did not understand why it was that he so continually insisted on their holding their books up with both hands in the services. He was requiring an intelligent part to be taken by each boy, not a careless following of the organ by ear.

A casual observer might easily misunderstand his policy. Sometimes it seemed as if his object was discipline. A disciplinarian he undoubtedly was, but at least in his later

years, when the school really began to grasp the greatness of his aim, his sympathy and enthusiasm was all the force wanted.

Perhaps he reaped the reward of his labours for music when the school performed *The Messiah.* Here he felt himself on familiar ground, for he was always a great student of the Bible ; few people can have spent more time and energy on interpreting and teaching the very words Handel has set to music. He said he intended to consecrate that Christmas term—it was his last Christmas term—to the work, and he spent many hours with his various classes in discussing its meaning. His great point was that every one should have a share, so that every one might understand. Once again they were to reach its meaning, not merely by listening, but by taking an active part in it. The performance was a very great success. Permission was given to broadcast it, and listeners as far as The Hague shared in the Oundle performance of *The Messiah.*

The Head pushed on to still bolder experiments. He began to look for another great work which was to have come at Christmas 1922. The idea of this massed singing had grown naturally out of the general spirit of the school music, and from the time the production was first presented to his mind he made it his own and threw all his energy and influence into its realisation.

It must not be thought that Sanderson's work for the school music was confined to the school singing. He was continually feeling his way—with difficulty because of his own limitations—to make individual work more and more ' life-giving.' He perhaps failed at times to realise technical difficulties because he had no direct experience of the practice of any of the arts, but he knew the fundamental truth that music as a collection of pleasant sounds

is nothing. He wanted the inner meaning which must be there, and because of his own difficulty he would search for another means of expression—a hopeless task, because there is no 'substitute' for music. It was not his wish that every boy who learns an instrument should become necessarily a competent performer. He aimed rather at using the instrumental teaching to extend knowledge and appreciation. He was never content with a realised advance. It must always be the starting point for another step.

During his later years music was much in his thoughts. He felt that in this country its possibilities for what he once called 'democratic' education, were undeveloped. He was actively working up to the time of his death at his plan for working in music with his 'Library' scheme.

This is fully described in another chapter, and all that is necessary here is to explain how he was applying it to music. He believed a knowledge and understanding of the Arts (as distinct from any skill in them) to be an essential part of education. Music being a language in which the mind of man finds expression, its manifestations are a part of History. The belief led to the particular form and the method of the 'Library' classes in musical investigation which have passed successfully through experimental stages during the last few years. The library or research method in connection with history, being applied to the painting and sculpture of a period, was afterwards attempted in connection with music. There are two purposes (we are now quoting Sanderson) for which a library may be used, the lesser and the greater. The first of these is to obtain facts or to verify details; the second—the greater—is to endeavour by its means to find the answer to some question; to solve some problem of importance; the worthiness of some form of art; the influence of a great musician upon his generation; whether

or no a composer truly reflected the spirit of his time. Such questions as these were to be considered.

Now, though books concerning music and musicians may be used for this object, the central portion of the library was to be a comprehensive collection of music in the shape of gramophone records, so that in the same way as the masters of literature are read, the great composers can be consulted, read as it were, in their own language. The practicability of getting together such a representative collection of works in this form, as could alone justify its description as a musical library for serious study, is already established, for every class of composition has been recorded and there is no composer of note who does not find a place many times over in the catalogues. Moreover, the lists are being extended rapidly month by month.

As to imperfections of the records themselves, Sanderson believed, as a scientist, in the possibility of great improvement upon even the best recording done at present; while at the same time, he accepted such imperfections as we accept a translation of a literary work, which though not showing the full power and beauty of the original, might yet give some insight into the mind of its author. As a later development he looked for the making of indexes to the contents of the library, guides useful even to the non-musical inquirer.

In working the classes one object he wished to be kept always in mind, viz.: *teaching the use of the library.* If a boy was but a short time in a set and had actually learnt but little of the music, it was of small moment, provided that he had discovered how to investigate, how to find out things for himself. With this understanding a larger number of boys could pass through a small class in a given time. On the same principle, if a period were under review, it would be sufficient if a small part or

single aspect of the period were thoroughly mastered. A real knowledge of some one great work counts for much.

Sanderson did not like the word 'appreciation,' but none of the usual methods of 'appreciation-classes' is ruled out. Matters of musical form, nationality, historical sequence, instrumentation, and other technicalities familiar to teachers, all have their place; but their use is, perhaps, more subordinate, more incidental to the main purpose—the actual knowledge of the music—than is found in most 'appreciation-classes.'

Musical boys, especially those who play, tend to gravitate to the sets engaged in this work, and to them the path is easier, yet the system is, and must be, designed for those who are 'unmusical.'

'I am not afraid to place in the hands of a young boy a book much of which is beyond his comprehension.' Something of the meaning of a difficult work will sink into the mind after seeing or hearing it many times. It was the creative artists who mattered. The composer, who according to the rules of some school, turned out skilful and pleasure-giving work, was of small account. The prophet, the revolutionary, whose vital expression could not be contained by convention, who in his day was often 'rejected of men,' whose work found its own form and created rules, was the man worthy of our study.

The subject of music teaching gave occasion for many of those *obiter dicta* which the headmaster delighted to throw down as an instant challenge to denial or reflection. 'It is the carefully graduated course that kills'—(the imagination, the longing). Every teacher sees the need of careful graduation, but not always are we alive to the moment when it must be departed from, when the boy needs the vision of some great work, a vision which may



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supply the necessary impulse to return on his tracks and carry out the laborious spade-work that had seemed to him meaningless.

In studying the history of music and the actual musical works of a definite period, he had a sure instinct that the art of each period had a definite bearing on the thought and the doings of the time and he wanted it brought out. But it was to be no superficial conclusion from second-hand information. Always he would have boys go back to original authorities. Text-books he disliked; he often complained that they copied errors one from another. Just as in science his boys were to read Faraday, so in music they must hear the works themselves on some instrument or on the gramophone, believing that the message is in the music, not in somebody's comment on it.

In these music classes, which we have endeavoured to describe, he began, as in all his experiments, on a small scale. He was fond of talking of revolution, but that was not his real method. Never very facile in expressing what he wanted, he felt that exaggeration was the only method of moving things out of their rut. People outside the school have sometimes thought he wanted to destroy what existed and start a new method in full working order all at once. They did not see his preliminary work, how he tried one plan after another till he found his feet. He was no red revolutionary; bold as his changes were they were always the fruit of long and patient research. In these music classes we have an example of a plan just crystallising into a system. There can be no doubt in the minds of those who worked with him that he was on the eve of another of his apparently sudden advances.

## § 8. History in Oundle School

'History,' said Lord Acton in the course of his famous Inaugural Lecture, 'is the true demonstration of Religion.' And in the Appendix to the volume in which this lecture is included, may be found the even bolder statement of D'Aguesseau, 'Je regarde donc l'étude de l'histoire comme l'étude de la providence.'

A belief in the reality of progress even more profound than that implied in these quotations was stated explicitly by Sanderson in his enthusiastic preface to Frederick J. Gould's *History the Teacher*: 'He sets out to show how man can be raised by studying how man has been raised in the past ages.'

An intense desire to make the past reveal itself as both purposeful and prophetic of purpose gave rise to Sanderson's anxiety to use one of the buildings which his loving care had created, as a place of vision where something at least of this faith might find proof, where, in fact, History might demonstrate Religion.

Up to the time of his death, he took an active interest in the preparation of a series and the arrangement of a sequence of charts, each of which was to contribute an illustration of some stage in the 'Rise of Man.' The earlier charts would show the most primitive stages of life, beginning from the approximate period when this world ceased to be Azoic. Some charts would find their place in the sequence as illustrating concurrent stages in the development of the mental, as distinguished from the purely physical, life of mankind—such charts would show the evolution of the simplest form of individual self-consciousness into the most modern form of collective self-consciousness.

It may be objected—and indeed Sanderson himself admitted to critics the force of the objection—that such an ideal would be negatived in the process of realisation, that the vision would be lost, so to speak, in the visualisation, and what was vitally dynamic would become devitalised and static, that the comparison of living causes would become an exhibition of dead effects, that instead of a process there would be an arrangement of products, that History, in short, instead of demonstrating Religion, would merely demonstrate itself. Therefore, when he spoke of the building in which this valiant attempt was to be made, he would never speak of it as a 'Museum': for the story of mankind is a tale that is still in the telling, and no one part of it can truly be dismissed as a tale that is told.

This work of setting out life as a story and yet possessing it alive is not complete, indeed it is only half begun. It was to be the crown of all that he hoped the teaching of history in Oundle might come to be: he was patient, and in patience he led those who worked under him forward to a vision which might be permanent for him, but which to them was nothing more than an occasional glimpse.

He never said to a group of boys that they should make such and such a part or parts of the Story of the Uplifting of the Race of Man—he would merely say to them, 'What period of history are you doing?'; and when they told him, he would answer, 'Find out between you what contribution that period has made to progress.' And because they had picked up at Oundle, perhaps half unconsciously, the habit of thinking in pictures, of working out their ideas in lines, of mapping out events, and measuring great movements with a rule, so they came to produce some charted course of happenings, some graphic arrangement of the

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spiritual forces of the past, which, however imperfectly—and many of them have been wonderfully vivid and true—did contain an appreciation of History as a sequence of causes and effects, not as a chaos of inconsequential catastrophes. At the lowest estimate, such work produces an indelible impression that the past has the coherence of a kinematograph film and not the incoherence of a kaleidoscope.

Moreover, although the finished result may not actually be worth hanging in the Hall of Humanity's Story, yet the effort of its accomplishment will have gone far towards informing the young workers with the spirit which that story symbolises and to the fulfilment of which it aspires; that is, the march away from blind and purposeless competition forward to a conscious co-operation for a common purpose.

And just as Sanderson looked upon 'group work' as leading up to this great end, so he utilised his School Library to practise the workers in those methods which they would need even more when working in a group than when working individually: the Library, in fact, was to be a training-ground as well as an arsenal.

For Sanderson made the School Library the complement of the School Laboratory—what the one was to the scientist the other came to be to the historian. Similarly, it was to be another kind of school workshop. And in the same way that the youngest boys had the chance of learning to use scientific instruments, test-tubes, or machines, so they also had the opportunity of re-creating the past, or throwing light from it on the problems of the present, by the use of books, documents, or maps.

It is a little while only since the laboratories of our great public schools were but mean and meagre buildings, housing what were held to be mean and messy studies unworthy of

the attention and time of any save a few perverted creatures among the boys, and a few ' uncultured ' outcasts among the masters. But in this comparatively short time, the science side has become, pre-eminently in Oundle, though not in Oundle alone, an important, integral part of the school life.

The possibilities of school libraries, meanwhile, remained for long unexplored. Either they were repositories of books which were valued only as antiques, or they provided a cemetery for ' free gifts ' of the type which neither masters nor boys would trouble to disinter. Consequently, the library in most schools remained a place to which hardly a boy thought of going voluntarily, even when the number of its shelves and the quality and interest of the volumes which they held had been increased. And thus, unless his home or his house library were particularly well furnished, a boy had no idea of books other than those educational evils of doubtful necessity, ' text-books.' Nor, usually, did he so much as hear of the original sources or the great secondary authorities to which the authors of this anaemic type of literature claimed to have resorted.

It was Sanderson's aim to show that it was possible for the youngest boy to perform for himself, and perhaps even to improve upon, the task which the makers of text-books appear to find without end. The lecture, or discussion, in the class-room should be supplemented not by the learning during ' preparation ' of a chapter at a time out of a very little author, but by the study, the attempted analysis and comparison of chapters out of several really great authors in the school library. Reduce such a problem to its simplest formula : it was to make it possible for many young boys while still at school to do what only a few favoured young men can usually get the chance of doing as undergraduates at a much later age.

In its practical aspect, such a problem involved the provision of a library so architecturally designed and internally arranged as to facilitate its solution : it must hold not only enough books, but also enough boys. Sanderson was fortunate enough in his own school to be able to satisfy both requirements. There was room for a whole form of boys to work comfortably and uncrowded ; and there was room for them to move about as the search for, and selection of books might require. And close at hand was an Art room which they could either use to make themselves acquainted with the pictorial masterpieces of the age which they were studying, or in which they could themselves work upon the maps or charts required in the solution of the problem they had undertaken to solve.

That it was found possible to submit the results of such a system to outside examination is a small matter, which only went to prove that this particular one of Sanderson's methods was as able, if need be, to satisfy the old demands as were any of the older methods. The first examination in Library Work was held by the Oxford and Cambridge Board in 1920. The only adverse criticism made by the examiner was that those boys who were weak in the ordinary examination tended to rise above their normal standard in this Library Examination.

Apart from the obvious answer that each boy does also take the ordinary examination in the period offered, this criticism would appear in reality to provide the strongest argument in favour of the Library Method. For such a criticism implies at least that the so-called ' weaker brethren ' have learned how interesting well-written books can be, and (which is far more important) have learned to create for themselves a considered verdict upon the evidence which they have collected. They have, in fact, read, thought, and originated something.

The following are examples of the types of questions worked out in the School Library in this examination. One or two themes only were to be attempted. The first set of problems deal with English History between 1783 and 1905—we give the first and last four; the second batch concern the period 1789-1815.

## I

1. Write in the form of a letter an account of England and of the position of England in the world about 1788, from the point of view either of an American or of a Frenchman living at the time.

2. 'Liberalism is apt to be Absolutist.' Discuss with reference to European History in the eighteenth century.

3. Disraeli once characterised the Government of England in the eighteenth century as a 'Venetian Oligarchy.' How far do you consider this description to be just?

4. 'The disappearance of the Small Landowner.' Estimate the implication contained in, and the importance of this phrase, and state how far the implied economic process had gone in England by the year 1789. Illustrate by maps or charts.

41. Contrast the aims of the 'Fenians' and the 'Home Rulers.' Also outline any Irish policy which your studies lead you to conclude might have prevented the troubles with which we are faced in Ireland to-day.

42. How far is it true to say that 'Every reform of the Franchise has merely succeeded in widening the basis of political incompetence'?

43. Trace the growth of Trade Unionism in England, and discuss what you consider to be the merits and

defects of this movement. Illustrate by charts or maps.

50. What is meant by Tory Democracy? Is it really a contradiction in terms? In the course of your discussion explain the origin and development of the idea implied in the phrase.

## II

1. 'The intellectual note of the eighteenth century is one of "enlightenment"—of the self-confident revolt of the trained mind against tradition for tradition's sake, and against whatever the intellect holds to be superstition or prejudice.' You read this in a text-book. It interests you:

(*a*) Explain how you follow up the question in the Library.

(*b*) Give your conclusions.

2. Hyndman in his *Evolution of Revolution*, writing on the French Revolution, ascribes a comparatively small part to the 'Intellectuals.' Do you agree with him? Discuss the question in essay form.

3. 'The political theory upon which the Revolution proceeded . . . is universal, is external, and is true'—(Belloc). Discuss this opinion in essay form.

4. Mrs. Webster (in her *French Revolution: a Study in Democracy*) considers, and attempts to prove, that the French Revolution was the result of deliberate Anarchist, Orleanist, and Prussian plotting. Do you find her opinions and conclusions, when tested by all the evidence available in the Library, really convincing?

5. 'An Adventurer who betrayed the Republic.' 'I am the Revolution.' Which is the true Napoleon—the one described by the first or the second quotation?

6. M. Marius Sepet has said with regard to Napoleon's share in the internal reforms of the Consulate, 'Son égoïsme gâtait tout. Les institutions nées de sa pensée ou sous sa main portent la marque fâcheuse de son intérêt personnel, à côté, quelquefois au-dessus de l'intérêt national.'

Mr. H. A. L. Fisher in chap. ii. of his *Bonapartism* has said, 'Napoleon brought to the task of government exactly that assemblage of qualities which the situation required—an unsurpassed capacity for acquiring technical information in every branch of government, a wealth of administrative inventiveness which has never been equalled . . . his government substituted a regular, scientific, civilised administration for a condition of affairs which bordered on anarchy.'

Which of these two contradictory opinions does your own reading lead you to support? Give the reason for your preference in essay form.

7. You frequently hear Napoleon spoken of as one who trampled under foot all smaller states and nationalities that chanced to come into his power—who devastated them in order to pay for further conquests. Take one state or province as an instance and draw up a report on the Napoleonic administration thereof, to justify or contradict the above statement. Quote authorities.

8. 'Among the many wise sayings of Napoleon there is one so wise that if it had guided his dealings with alien states, as it inspired his policy within the borders of France, there might have been no cataclysm. It is this: "The strength of a people depends upon its history"'—(Fisher, *Bonapartism*). Discuss this quotation. Illustrate by maps.

9. 'Les prétextes de la guerre changent, comme les

armes des combattants; mais c'est la même guerre qui se poursuit, et qui ne se finit pas plus à Vienne en 1815, qu'elle ne s'était finie à Utrecht, à Nimègue, aux Pyrénées, à Osnabrück et à Münster.' Discuss in essay form this great generalisation of Sorel.

10. 'It is hardly too much to say that the Revolution would, in France at least, have achieved its object and created a homogeneous, centralised democracy, had not this great quarrel between the Republic and the Church arisen'—(Belloc). Discuss this quotation in essay form.

11. 'The eighteenth century was a period of prose . . . the next period was an age of poetry.' What are the conclusions, if any, to be drawn from this fact?

12. Was the effect of the French Revolution upon Art that of a tonic or a purge?

13. Compare and contrast the First French Revolution with the French Revolutions which succeeded it.

14. Discuss the part played by the Idea of Progress in the French Revolution, and also the effect of the French Revolution upon the Idea of Progress.

It might be said, 'Any intelligent boy could go into any adequately arranged library and do the same thing.' But even so, it may be doubted whether he would do the thing successfully unless he had had the opportunity of practice in the use of libraries and in the proper handling of books. How much more necessary, then, such practice must obviously be in the case of thirty boys! The truth is that the value of this particular type of examination can only be measured by the extent to which the normal examinations fail. Here is something like a test not of cramming but of capacity—here, one can say to a boy, is a chance not of remembering what some one else has

thought it worth while to say, but of conceiving and setting forth something really worth while saying for yourself. The effort required is not that of the memory but of the mentality, not the effort of a purely animal faculty, but of the God-given faculties of analysis, criticism, and creative construction.

The following instructions in the use of the Library for historical purposes were drawn up under Sanderson's guidance :—

' At the beginning of the School Year the form goes into the Library, and each boy is given a printed scheme containing the General Idea, the Special Idea, and the full list of books. During the Michaelmas term each boy reads by himself : and it has been found best to encourage him to read books from more than one part—sections of at least three parts thus being covered by each boy when the end of the first term arrives. Then, each boy in the form knows, before beginning the second term's work, the books which are most helpful to the understanding of the main topics of the period. He knows, at any rate approximately, what each of the several possible authorities can contribute to any historical problem which may arise within the period. He knows whereabouts in the Library these books may be found. In short, by December in any particular year he has learned what books to use, where to find them, and how to use them when found. During most of the Lent, and the first part of the Summer term, he is working not as an individual, but as a member of a group. In company with one or two other boys, he chooses a problem from a list of specimen questions (of the type already exemplified), and then he takes up his share of the work involved in its solution—a share which may involve analysis of authorities and historical evidence, or synthesis in the form of a report, or illustration by means of a time-chart, graph, or map.'

Thus at the end of the school year the form has practised both individual and group work, and already possessing the fruits of the latter, it is ready, if need be, to face the individual competitive examination.

It will make all this much clearer if we give a few extracts from the scheme actually used in the study of the period 1783-1905.

## SCHEME OF LIBRARY WORK

### History (1783–1905)

#### GENERAL IDEA

The form divides itself into as many groups as there are sections in each part, and each group selects one of the sections for investigation. Again, the groups will subdivide their work according to their tastes and capacities. The Library is supplied with the necessary authorities either in English or a foreign language. The boys make analyses of the books or gather from them their contributions to the main thought. They may also cull out quotations which give the spirit of the book. Discussion will lead to criticism ; and each group will eventually draw up a final report on the subject which they have investigated. Where complete agreement within a group is impossible, minority reports are encouraged. For examination purposes, the scheme lends itself to research work and thesis-writing by individual boys.

#### SPECIAL IDEA

The parts into which the scheme is divided are as follows :—

I. Before the French Revolution.
II. England and the French Revolution.
III. Reaction, Reform, and Repeal.
IV. Nationality and Liberal Intervention.
V. Gladstone and Disraeli.
VI. Modern Problems : their Evolution, 1783-1905.

The following extracts from Parts I., V., and VI. will illustrate more fully the nature of this scheme.

## PART I [1]

### Before the French Revolution

English Political History.—George III.'s attempt to be a king; his ministers, his parliament, the political parties, and how he tried to influence and control them; results for England at home and abroad. Books: P.H.E., 1760-1801; Fletcher, *History of England*; Grant Robertson, *England under the Hanoverians*; *Life of Chatham* (E.S. for ideas on early part of reign); *Pitt* (E.S.); *C. J. Fox* (Trevelyan); *John Wilkes* (E.B., D.N.B.); *Letters of Junius*; Lecky, *History of England in the Eighteenth Century*; Green, *Short History of the English People.*

Social History.—Books: *Social England*, v.; *C. J. Fox* (Trevelyan); *Chesterfield* (Craig); *Worldly Wisdom of Chesterfield* (Hill); *History of Everyday Things in England*, vol. 2; *Social Life in England* (Synge).

Economic History.—Enclosure, invention, industry, and the growth of an industrial class. Books: *The Town and Village Labourers* (Hammond); *Disappearance of the Small Landowner* (Johnson); *History of the English Agricultural Labourer* (Hasbach); *English Farming, Past and Present* (Ernle); *Growth of Industry and Commerce* (Cunningham); *Landmarks in Industrial History* (Townsend Warner).

## PART V

### Gladstone and Disraeli

Personal Characteristics.—Lives and Biographical Sketches: Morley; Paul; Sichel; Monypenny; Spencer Walpole; Strachey (Eminent Victorians); McCarthy; *Punch*; *Illustrated London News*; Wells, *Outline of History*, XXI.

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[1] Explanations of Abbreviations

E.B.—Encyclopædia Britannica.
D.N.B.—Dictionary of National Biography.
S.N.—Story of the Nations Series.
P.H.E.—Political History of England Series.
E.M.A.—English Men of Action Series.
E.S.—English Statesmen Series.
H.N.—Heroes of the Nations Series.
C.M.H.—Cambridge Modern History Series.
H.U.L.—Home University Library.
E.M.L.—English Men of Letters Series.

THE REFORM ACTS OF 1867 AND 1884.—P.H.E., XII., *England since Waterloo*; McCarthy, *History of Our Own Times*; Montagu, *Elements of Constitutional History*; *Gladstone* (Morley); *Disraeli* (Sichel); *J. Bright* (Trevelyan); *Punch*.

1870.—*Bismarck* (*Reflections*, Butler); *Bismarck* (H.N.); *Franco-Prussian War* (E.B.); *Main Currents* (Hearnshaw), VII. and VIII.; *Development of European Nations, 1870-1914* (Rose); *Bismarck* (S. Walpole); *Napoleon III.* (S. Walpole); *Illustrated London News*; *Gladstone* (Morley); *Queen Victoria* (Lee); Guedalla, *The Second Empire*.

ENGLAND AND THE NEAR EAST.—*Development of European Nations* (Rose); *Disraeli* (Monypenny); *Gladstone* (Morley); *Eastern Question* (Marriott); C.M.H., XII.; *History of Serbia* (Temperley); *Rise of Nationality in Balkans* (Watson); *Punch*; *Illustrated London News*.

IRELAND.—*Parnell* (E.B.); *Irish Nationality* (H.U.L.); C.M.H., XII.; *J. Bright* (Trevelyan); *Queen Victoria* (*Lives*, Strachey, Lee, and Holmes); *Gladstone* (Morley); *Victoria, Letters of*.

GLADSTONE'S FAITH IN NATIONALITY AND BROTHERHOOD; DISRAELI'S POLICY OF IMPERIALISM.—Great treaties, nineteenth century; *England since Waterloo*; P.H.E., XII.; C.M.H., XII.; Pollard, *History of England* (H.U.L.); *Main Currents* (Hearnshaw); *Century of Hope* (Marvin); Wells, *Outline of History*, XXI. and XXII.; *Gladstone* (Morley); *Disraeli* (Monypenny); *Punch*; *Illustrated London News*.

## PART VI

### MODERN PROBLEMS: THEIR EVOLUTION, 1783-1905

IRELAND.—*Ireland in the Eighteenth Century* (Lecky); C.M.H., VI., VII., IX.; *O'Connell* (H.N.); *Peel* (E.S.); *Fenianism* (E.B.); *Gladstone* (Morley); *Disraeli* (Monypenny); *Parnell* (E.B.); *Ireland, Industrial and Agricultural*; *Ulster and Ireland* (Good); *History of Our Own Times* (McCarthy).

LAISSEZ-FAIRE, LABOUR AND TRADES UNIONISM.—*England under Hanoverians*; *Adam Smith* (E.B.); *Landmarks in Industrial History* (Warner); *Growth of Industry and Commerce* (Cunningham); *England since Waterloo*; *Recent Developments in European Thought* (Marvin); *Century of Hope*; *Socialism* (Bax, Beer); *Chartism* (Howell); *Labourer Series* (Hammond); *Evolution of Industry* (H.U.L.); *Unemployment* (H.U.L.); *History of Trades Unionism* (Webb); *Problems of Village Life* (H.U.L.).

RELIGION.—*Wesley* (E.B. and *Life*); *History of Church of England* (Wakeman); *Century of Hope*; *Nonconformity* (H.U.L.); *Manning* (Eminent Victorians); *Freedom of Thought* (H.U.L.); *Papacy and Modern Times* (H.U.L.).

EDUCATION.—*Century of Hope*; *State Intervention in English Education* (de Montmorency); *Education* (E.B.); *Arnold* (Eminent Victorians); *Labourer Series* (Hammond).

POLITICAL THOUGHT IN ENGLAND.—*Bentham and Utilitarians* (H.U.L.); *Spencer till to-day* (H.U.L.); *Socialism* (H.U.L.); *Socialism* (Beer); *Liberalism* (H.U.L.); *Conservatism* (H.U.L.); P.H.E., XII.; *Life of Victoria* (Lee); *Queen Victoria* (Strachey).

The historical problems tackled by groups of boys usually consist either of the 'knottier points' in a printed paper of specimen Library Questions, or of questions which have cropped up in the course of discussion after lectures. Here, for instance, is a series of problems arising out of the above scheme.

1. 'An Enquiry into the Condition of the Agricultural Labourer from 1740: Reports and Charts.'
2. 'The Effect of Napoleon's Continental System upon British Food Supply and Trade: Chart.'
3. 'An Enquiry into the Fairness of the Title "Adventurer" as applied to Napoleon in a recent historical work.'
4. 'Maps to show the Redistribution of Population resulting from the Industrial Revolution in England.'
5. 'An Enquiry into the Responsibility of Prussia for the Disasters which overtook her in 1806-1807.'
6. 'An Enquiry into the Working and Results of the Napoleonic Administration of "occupied states."'
7. '"In War unity of command is everything—divide to march, concentrate to fight." An illustration of Napoleon's military maxims from his own successes, or from the failures of his opponents, in various campaigns: with maps and diagrams.'

Little need be said here about the use of the Library in the teaching of history to the junior boys at Oundle—not because their case is any less important (indeed in their case the groundwork is obviously most important), but

because they follow the same lines and aim at the same results as the senior boys, only in a rather simplified way : thus, in the case of a form of junior boys who had read Hilaire Belloc's *Eye-witness* (a most excellent collection of sketches for stimulating historical interest in boys), the object of the work done in the Library was—

'To give each boy a chance of doing for himself something of what Belloc must have done when working up his *Eye-witness Sketches, i.e.* getting an intimate knowledge of some aspect of what is loosely called "History"—so that he will feel really at home in some period, or part of that period, which the form is studying. Combined with this is the advantage of practice in individual analysis and co-operative synthesis.' The method adopted here is a division of the whole form into groups of two or three boys, working from a programme already arranged in detail, or (as has been equally successful) a rough division into two or three large committees. In the latter case, each committee is given a general subject of research. In consultation with the master it subdivides this work : each part of the job is then dealt with by a sub-committee which decides for itself whether the result can best be expressed in the form of map, model, diagram, picture, chart, or essay.

So far an attempt has been made to indicate the part played by the School Library : it remains to say something of the class-room and other work which led up to the Library work, just as Sanderson intended the Library work to be but a stage in the ascent to what he called the Mount of Vision which was the crown and justification of all this teaching.

No headmaster was ever less of a slave to pedagogic 'methodism.' He believed, in fact, that too much depended on the man for any method to prove infallible. If the man meant business the method would be successful :

but if the aspiring teacher had been unfortunate in his choice of a profession, he would be justified by works no more than by faith—and certainly not by the works of those who sat under him. This is a platitude; but it is, unfortunately, also a truth—and it will prevail against months of summer schools and miles of educational encyclicals.

At the same time, it would be quite insufficient to say that all Sanderson did was to exercise his talent for selecting subordinates, and then, when he had made his choice, say to the man chosen, 'Go and teach.' He had certain distinct preferences and certain definite dislikes: collectively these supplied a body of principles: in semi-military language, they were instructions, but not orders.

For example, subject to the elimination of the obviously soulless, each man was allowed to decide for himself with what staple book he would provide his form for History or for English work. But in the case of History the book was to be merely for reference; it was to be an incidental, not an essential factor in the work done; it was, so to speak, to be a railway guide, not a railway system; it was to play the part of a useful calendar, not of an infallible Koran. Just as guidance and not dogma was to be the contribution of the teacher, so matters of fact, not of opinion, should be the contribution of the book. Consequent upon this view of the book used by a form, was Sanderson's view of the use that should be made of the book. He disliked intensely an entire dependence on the method which was so popular in public schools twenty years ago: that of giving to a class of boys a chapter of some text-book to prepare, and then testing the conscientiousness or otherwise of the preparation by the infliction of twenty or thirty one-word-answer questions, rapidly announced by the teacher, rapidly corrected by the boys, and rapidly destructive of any interest in history whatever.

It was realised by Sanderson, as by any man who has mastered any subject involving the co-ordination of ideas, that only honest work—for which he was quite ready to use the old-fashioned word ' grind '—could provide the boys with that arrangement of pegs upon which they might ' hang ' their ideas : and that without these pegs, stimulating teaching and even quite industrious work in the Library would be of no avail : would, in fact, merely be substituting a chaos for a void. Therefore, just as some short part of the first few weeks spent by a form in the School Library was usually devoted by each boy to the making of a time-chart indicative of the chief events and main movements of the period to be studied, so the hours of preparation were usually spent in the working out of short historical essays dependent upon the use of the master's ' notes ' in conjunction with the text-book (or books). This plan, any novelty in which must derive entirely from the inspiration or originality of the problems which the teacher may set, has been found to work as well with quite young boys as with older ones. It maintains genuine ' interest ' while making for real work.

Sanderson had, as has been implied, no objection to the use, in moderation, of the formal lecture involving the taking down of notes. Indeed, as has also been implied, he preferred boys to be furnished with their own teacher's notes rather than with some external teacher's text-book. But he always expressed a wish that the note-giving should not decline into the mechanical monotony of mere dictation, nor into the verbose and formal lecture which can only result in a strain on the powers of attention and a tax upon the power of consecutive thought. If the notes were to be dictated, then the teacher was to dictate the essential skeleton only ; the skeleton was to be clothed with the flesh of discussion and relevant talk. The formal lecture

was to be made less one-sided and less difficult to record, in much the same way. But here again, Sanderson considered the method less than the man.

His views on the subject of 'Historical Atmosphere' were quite individual. They sprang naturally from two great beliefs of his: that the school should be self-sufficing and that the boys in it should be craftsmen. Consequently he was not in favour of making the attempt to re-create the atmosphere of any given age dependent upon the purchase of large quantities of the various materials which, in the shape of pictures and models, are now so artistically conceived and so abundantly produced for the educational market. He desired that each form should provide, out of its own research, inspired by its own imaginative effort, made by its own hands, these things for itself. His belief in the need for inculcating craftsmanship led him further than this: he believed that it paid to destroy these models and pictures when the educational need of the form which had created them had passed: he feared that keeping them would stifle the initiative and sterilise the creativeness of other forms which in the future might be studying the same age.

Visitors to Oundle frequently ask whether it is believed there that the teaching of European History should be stressed. They receive the answer which probably any other school with a live interest in life would make: that it was most firmly believed that nothing less than the universality of history should be stressed. Sanderson agreed absolutely with the proposition that 'there can be no common peace and prosperity without common historical ideas . . . without such a basis any true binding culture of men is inconceivable. Without it we are a chaos.' Where not only one school but one man differs from another is in this fixing of the point at which this

universalisation of man's story should be begun. Should one seek to begin teaching it to children, to boys, or to young men? It is impossible to avoid the feeling of a kind of narrowness in saying that History should begin at home, as of the kind of selfishness which one feels in saying that 'Charity begins at home'—the more so because Charity and History, if not the same thing, obviously should go hand in hand, since 'to know all is to pardon all.'

Nevertheless Oundle has come to the view—though for Sanderson and those who served him it has been a matter of acquiescence rather than enthusiasm—that Universal History is best left to the top forms. This is not to say that much good work in showing 'History as one whole' is not done in connection with the Library Method—indeed, to some extent it is bound to be concomitant with an intelligent use of that method. But it remains an undoubted fact that simple stories of the mythical Hengist, the culinary Alfred, the elusive Hereward, and the gluttonous John seem likely to provide the preliminary stages of historical education for the average English child so long as the State allows parents to keep their children at home below the age of five.

It was therefore decided that, since an historical background had to be provided before an historical sense of proportion could be developed, a year's course of English History should be made the foundation on which the superstructures of first European and then Universal History might be raised. With all the junior forms going through such a course, it has been possible for a young boy promoted from one junior form to another junior form to pick up the thread of the story approximately where he dropped it at the end of the preceding term.

In conclusion, it may be said that Sanderson had a personal enthusiasm for history quite unique in a man

of so many educational interests. So strongly was this aspect of what has been called his ' love of life ' marked, that it was usually noticeable, even to a stranger, in less than ten minutes' conversation. It is safe to assert that whatever side of that world's life in miniature, his school, he was discussing, he would invariably betray the immense emphasis he placed on a knowledge of the past which makes that life what it is. In short, if Sanderson was a scientist because he loved truth, he was certainly himself a historian because he believed in the need for setting out the truth.

Yet, while this love of history was quite extraordinary in a man whose own education had not specifically included history as a study, there was nothing of that rather petty love of irrelevant detail which so often distinguishes the man who likes to talk of history as a ' hobby.' Great men and great movements interested Sanderson : the little details of ordinary life in the past did not. He believed that it mattered vitally what a man had inside his head—but that it mattered not at all what sort of hat he wore outside it.

Mention of his interest in great men makes it equally necessary to mention the remarkable tolerance and impartiality which conditioned this interest. It might have been expected that with his overwhelming faith in the community of men he would have belittled, if not actually deprecated, the ordering or disordering of the affairs of men by great elemental ' supermen ' in the past. On the contrary, it was the honest, but as he believed mistaken, efforts of some authors to belittle such figures which he deprecated. In Alexander, Caesar, and Napoleon he saw something of that great plan which he believed it to be the true function of History to reveal : he would not hear of the casual application of the title ' Adventurer ' to men who, in his opinion, were but the agents or the instruments

of a universal purpose. He did not agree with Acton's insistence on the necessity of judging such characters by the conventional codes. If one realises this side of Sanderson's interest in history, it is easy to see why he believed that some knowledge of Military History was not incompatible with a desire for a permanent peace: for where these men had planned, and marched, and fought to fulfil the design which was thrust upon them, there, he believed, was a chance of looking into the working of their minds.

Much more might be written in illustration of Sanderson's enthusiasm for the teaching of history in his school. As one writes this, one thinks of the personal help he was always so ready to give; of his visits to the Library and the eagerness of quite small boys to show him what they were doing; of the informal way in which, with obvious enjoyment, he would sit down with young historians and prove out of his deep interest and wide reading in Sociology and Economics that present politics are indeed past history; of how with his keen eye for co-ordinating the various activities of school life he combined the teaching of languages with the practice of historical research—so that Modern Languages and Modern History sat down at the same table and worked at the same problems. This personal help and guidance and inspiration loom large among the things which one wants to set forth clearly so that others may understand something of what Sanderson aimed at in his treatment of the story of that 'Adventure of Mankind' to which he himself gave such devoted allegiance and service.

### § 9. Biology and Agriculture at Oundle

It was not until Sanderson had been headmaster at Oundle for twenty years that the work of developing the

biological side of the school really began. His early struggles were over, his name was well known, and Oundle had already established a high reputation among those who could appreciate the importance of the work he was endeavouring to carry out. The time was opportune, and the headmaster prepared to promote vigorously the development of Biology. New science buildings were already contemplated. The indoor provision for Biology at the school had hitherto been in the chemical laboratory. The early work in Biology was done with a few boys, who wanted Biology as a step towards a future career and were to be prepared for various examinations. But Sanderson had no interest in vocational teaching of any kind. A subject, for him, was an educational instrument, a tool in his bag, to be used when other tools had been found less useful or perhaps entirely ineffective. Now Biology was to enter into a new home — a large laboratory with class-room and museum room, and outdoors land without limit. It was Sanderson's custom to entrust any such piece of work of development to an assistant master as an enthusiastic co-operator, who would receive every form of encouragement man could desire. Under such happy conditions it was possible for much to be done, and much was done. After two years of development in peace came the great war of four years' duration. War, however, was not allowed to arrest the rate of development, though it undoubtedly exerted some temporary influence on the line of progress. War conditions tended to emphasise the many ways in which biological science could be applied to the great work of lightening the lot of man, of easing his burden, of brightening human lives. Sanderson was allowed in all but ten years of life in which to encourage and develop biological studies—a very short time when one considers the many other activities of school life that concern the headmaster of a great school. Yet these

ten years were fruitful almost beyond belief—fruit yielding fertile seeds likely to produce greater and greater growth.

The new biological class-room and laboratory were more than mere rooms, provided with suitable furniture—they formed a living museum. They were intended to be, as far as possible, a full expression of his views of what real live education should be. He wanted everything in abundance —spacious. If there were any great examples he could follow, he contrived to do so. He therefore desired that in part his laboratories, gardens, and farms should resemble, as he was wont to call them, a young Zoological Gardens, a thumb-nail Kew, or a small Rothamsted.

Agricultural experiments were begun in 1909. The first operation was a field trial to find out the right way to treat a field of five acres which had been bought recently for school use. This led on to measurements of the productivity of the new cross-bred wheats, which were about to be offered for general use by Professor Biffen as the result of his experiments at Cambridge. Trials were made next of various imported wheats, French, Dutch, and Canadian. These were put in comparison with a pedigree English wheat, the yield was measured, and the corn was ground and used for bread-making trials. In these and all succeeding experiments, it was required that the work should be on a real scale; and the economic aspect of the work, though secondary, was not neglected. Boys are always ready for a new pastime or a new toy, but their interest dies quickly away. On the other hand, they take up real inquiries with zest and pursue them to the end. Because Sanderson wished education to be real, the farm must be real also. Five acres soon became thirty, and later on a hundred. Yet he approved of the repetition of classic experimental work, such as Mendel's work with peas. He loved the beautiful, not merely the beauty of detail, but the

beauty of mass. He believed that some of the strongest appeals could be made through great masses, say, of colour in a garden. They would fire the imagination. To him, a garden was a place well ordered, beautiful—where boys and others who would might learn with the master as guide. In such a garden he liked to employ a favourite expression, 'No teaching shall be done here.' A life in a garden was symbolic of man's duty to 'keep and dress the garden.'

It is the duty of a school, as he often said, to give every boy the fullest opportunities of experience and work. There were no favoured or specially selected few. In the case of Biology he planned that every boy should be given the opportunity to study this subject. He arranged for Biology to be included in the curriculum of boys in all parts of the school, and outdoor work was made not only possible but attractive.

Everything that the school possessed was intended in some way for the boy's welfare. Nothing was merely for show—nothing withheld from the boy's use. It was reckoned that damage might possibly be done here and there by inexperienced or careless hands, but this risk must be run, Sanderson laid down, because in denying any one thing one might be denying, he believed, educational salvation to a boy. Before everything, the boy was sacred. Buildings, apparatus, elaborated schemes, were therefore all part of his method, and any account of his methods must necessarily include some outline of the educational material he founded and used.

Indoors there were aquaria and vivaria, large and specially designed incubators for all purposes. Animals were kept as far as possible under natural conditions—plants grown. Experiments proceeded that all might watch and follow. Charts were shown explaining the progress of biological thought. Photographs of the great

biologists were on the walls. Standard works, accounts of research, proceedings of learned societies were to be found in the laboratory library. From time to time various exhibits were made—some illustrated Biology as applied to industry. A well-equipped photographic room made it possible for photographic records to be kept, and specially interesting work was done by the photomicrographic apparatus. A projection lantern was in common use. Valuable to boys was the advisory work undertaken by this department. In some work they could actually co-operate, in other work they could only follow, but in either case their experience was enlarged and their opportunities increased.

Surrounding the laboratory were the gardens. These were laid out in a short space of time, and after one or two years rock plants, plants of pond, marsh, and seashore, climbing plants, fernery, rose garden, and a large herbaceous border made their appearance, despite a time of war. Boys were not to be deprived of their heritage because men quarrelled and fought. One piece of work stands to the memory of a well-beloved son lost in the war—an avenue of oak trees. Long may it flourish, for its purpose was very dear to him.

'Real live education—boys marched up to the frontier of the unknown—to go into the world as pioneers—Darwins—Listers.' These words would form part of the theme by which he would explain the purpose of his gardens and farms. As we have mentioned before, there were two farms, one purely experimental and the other a large farm where normal agricultural operations occurred.

Lectures to the school were frequently given by great biologists and agriculturists.

In all agricultural work there was intimate collaboration with the farming community of the neighbourhood, who came to lectures, made frequent use of the advisory side of

the work, looked to the school for the repair of agricultural machinery and implements, and even for the shoeing of their horses. The farmers were appreciative, and willingly made return by allowing experiments to be conducted on their farms or permitting boys to visit them. All this was part of his aim to make science render service to mankind. Not for one instant did he aim to train the boy to become a farmer or to help the farmer increase his worldly wealth. Sanderson was zealous for the cause of science in the service of man. He loved to think that boys of his school might go out into the world deep students, research workers, men of thought and action, great leaders. Medical science, agricultural science, sociological science made a strong appeal to him for this very reason.

From one year to another, boys in all parts of the school would be engaged in a real study of Biology—both pure and applied.

Visits were often made to great institutions such as botanical or zoological gardens, research stations, in term time and during holidays.

In all that has been said, no mention has been made of examinations, for they were not the *raison d'être* of any work that was undertaken. Nevertheless public examinations were taken by boys, and if success can be measured in terms of results, then success was certainly achieved. Nor must it be thought that because Biology in the school was able to make so wide an appeal that interest was short-lived, knowledge superficial, or exact training neglected. The appeal was both deep and wide. Boys have gone directly from Oundle into research work, have gone on in fact to post-graduate work, and have produced distinguished papers in such periodicals as the Zoological Society's *Transactions*.

No account of Sanderson's methods would be complete

that did not contain a word upon those occasions when a great display of exhibits and experiments was organised. They were usually the culminating point of the year's efforts, and a fairly accurate reflection of a year's special activities. One might venture on many good reasons for his desire for such displays—all in part correct. Such an occasion certainly acted as a great stimulus, and attracted in its wake a large army of willing boy co-operators. A great array of work, a great army of workers, a great mass of zeal! He gloried in it. Of biological science he had but the smallest knowledge, yet a wonderful insight. During such displays he would visit and get to understand each experiment and exhibit. He would pass by nothing (except anatomical dissections), and even had he not been headmaster, he would have proved the most stimulating and interested visitor.

He was able to produce by his enthusiastic love of science a similar enthusiasm in those about him, to maintain at their maximum the working powers of his assistants. Owing to his lack of exact training in biological science, he would at times make inaccurate statements, or interpret biological facts incorrectly, but a short explanation, a sound criticism, he would accept at once.

He was especially interested in Evolution, and spent a good deal of time in reading up the theories of Lamarck, Darwin, Weismann, and others. But, as he would say, he must learn in such matters of his assistant masters. He was so great a headmaster that he was ever ready to learn, to be a disciple.

He took an active part in the organisation of the farms and gardens. He would come at all times when one was at work, watch and encourage, criticise and help. Others might appear occasionally and say superficial things, but one could always rely upon his appearing regularly, with

a knowledge that in some way or other his visit would bring fruitful advantage to one's efforts. He would humorously state that his chief employment was to 'walk about.' He would assert that his earlier work in Mathematics had caused him to feel that some studies were too rigid and 'static,' and that in the newer field of biological thought there was greater freedom. Biology, he said, looks into the future, goes down to the root meaning of all things.

He was always busy with constructive development. At Oundle Biology was a virgin field—there was everything to do and nothing to undo—that was one of the most fortunate phases of the situation. He was anxious that the work done should have some bearing on the advance of our knowledge concerning life, its beginning, its story, its meaning, boy life, humanity.

He had a great desire to see progress in applied Biology, in science as it served man. Darkness, death, and decay, he sought to have removed. He pleaded for knowledge that would serve the cause of mankind, that would improve the lot of the worker, that would give the world 'life'—life more abundantly. He spared the energies of his co-operators no more than he spared his own. He was always at work. But he would contrive that there should be the least possible delay in giving an experiment a trial, in putting a scheme into practice, in carrying out any well-conceived plan. He would spare neither money, time, nor energy. If one should show at times irritation at delay, or at slowness of development, he would produce one of his radiant smiles and might perchance say something of his earlier and larger struggles for the development of the school.

It was never his intention that any piece of work should be regarded as an everlasting model. It must serve as a stepping-stone to higher and greater things. One

believes that he wished all his work to be regarded in this way. Oundle was not to be a model for others, but others were to note its failures and its successes (just so far as they went) and to learn from them. He published full accounts of the work done at his school for this purpose, and not for advertisement or self-aggrandisement. He welcomed constructive criticism. With the same purpose he criticised the work of others, for he wished all work to be assessed at its true value without delay so that constructive work might go on uninterruptedly.

Never for self, he was militant for the progress of the causes of education and humanity, and he valued opportunities of stating his views on such subjects. He never feared opposition—'Worse, far worse than opposition,' he would say, 'is coldness.' In him there was no timidity, nor was he ever obscure, except to those ill qualified to understand. It has been said that he could not present his views in a definite formal manner, but how could he do so when they were never fixed but ever moving, expanding, becoming more comprehensive. One could always feel that there was greater meaning in his views than could at first be gathered from the spoken word. Perhaps, as may be said of many others, the time was not yet ripe for the acceptance of all such ideals as he originated. If he enunciated any one great principle more clearly than others it was that of 'service and creativeness.'

In these few words one hopes that one has done justice to his methods and aims. How can one write of Sanderson as gone from life, who yet lives and speaks through every thought and deed he has inspired? And how can one write aught with certainty of him who would have said himself:—

> 'Why, even I myself, I often think, know little or nothing of my real life,
> Only a few hints, a few diffused clews and indirections.'

## § 10. The Science Society and the Conversazione

In Sanderson's second term at Oundle (Lent 1893) a Photographic Club was started. At that time very few boys possessed cameras; the Club purchased quarter and half plate stand cameras which were lent to members of the Club. A competition was held in the summer term, and the photographs were exhibited on Speech Day, which was then held at the end of term. The exhibition was of interest to the visitors, for many of the photographs were of school subjects.

When the Club had been in existence a few years an annual excursion was arranged to some place of interest in the neighbourhood. The outing was primarily for photographic purposes, and many photographs were taken, but the social side was also very enjoyable. As many bicycles as possible were hired, some of the riders reached the destination in safety, some even returned in the evening with at least parts of the same machine on which they set out. Two brakes accompanied the party (it was long before the days of motors) and carried those who had been unable to secure bicycles, picking up derelicts found by the roadside. Mrs. Sanderson entertained the party to tea; she and the headmaster both entered fully into the fun and enjoyment of the outing.

The apparatus owned by the Club was added to from time to time, notably by an outfit for taking and exhibiting coloured photographs by the Sanger Shepherd process.

After some years of useful existence, the Club was absorbed by the Science Society; the original purpose for which it was formed had ceased to exist, for cameras had become a common possession of the boys. The photographs shown on Speech Day were of so much interest to the parents that it was thought well to extend the exhibi-

THE SCIENCE BLOCK

tion to include some of the work done by the boys in the workshops. A few years later a further extension was made, and scientific apparatus which might be of special interest was included. A few demonstration experiments were performed in the interval of the school concert. The following year boys were put in charge of the apparatus, to explain its use. The next step followed quite naturally; instead of explaining the use of the apparatus the boys actually demonstrated its use, and in 1906 the exhibition became a scientific conversazione.

Sanderson speedily noted the educational value of this work; the scheme developed to such an extent that the original idea of something of interest to visitors became quite subsidiary to the value of the work to the boys taking part in it.

The Science Society had been founded in 1898 with the object 'of giving members an opportunity of learning interesting facts which do not come in the general course of school work.' This purpose was carried out by lectures illustrated whenever possible by experiments. In the course of a few years the science syllabus of the school was so widened that many of the 'interesting facts' were included in ordinary school work. The Society was reorganised in 1902, and its objects were stated to be :—

1. To arrange for lectures by members and others.
2. To encourage the study of Natural History.
3. To keep a register and to take charge of the scientific apparatus of the school.
4. To keep meteorological records.
5. To conduct experiments and to carry out research.

Of these five purposes, the third was found to be unsatisfactory, and was abandoned. The fourth was continued for some years, but the break caused by the holidays made

it advisable for the actual readings to be taken by one of the school staff instead of by the boys. As the biological work in school extended, it was found to include a considerable part of the second division. This left the first and the last divisions as the main objects of the Science Society.

For the ordinary members there is no doubt the first purpose was the most important, but for the senior boys the last was of most interest and value. The actual work done by the senior boys varied from year to year, depending upon individual tastes. Good work was done for several years in the study of habits of birds, and excellent photographic records were obtained. At another time the orchids of the neighbourhood was the subject chosen; a monograph was prepared for publication, illustrated by coloured photographs. Investigations, either actual researches or of the nature of research, were carried on on aniline dyes, atomic weights, coal-tar products, and the spectra of metals. In recent years wireless telegraphy and telephony have found many followers, and work has been done on 'electrons.' The experimental work carried on has generally led to papers on the subject; the papers were of value, for they necessitated the crystallisation of the knowledge gained.

In the summer term much of the energy of the Society was expended on the conversazione; preparation for this began early in the term. All the senior boys in the school were eligible for this work, the only qualification necessary being a willingness to work and to sacrifice some, at least, of their free time. There was never any dearth of willing workers, the total number often exceeding two hundred. The chief divisions of the conversazione were: Physics and Mechanics; Chemistry; Biology; and Workshops. A boy who volunteered to help was left free to choose which branch he would like to adopt. Having chosen, he gave

his name to the master in charge ; if he had any particular experiment in view, he mentioned it, and if suitable, it was allotted to him. If he had no suggestion, an experiment was suggested, and he was told where information could be obtained. As a general rule two or three boys worked together at any one experiment.

Some of the experiments chosen required weeks of preparation ; there was apparatus to be made and fitted up, information to be sought and absorbed, so that on the final day an intelligent account could be given to any visitor watching the experiment. This work was all done out of school hours. Four or five days before Speech Day, ordinary school lessons ceased for those taking part in the conversazione; the laboratories, class-rooms, and workshops were portioned out so that each boy knew exactly where he was to work, and how much space he had. The setting up of the experiments began. To any one visiting the school on these particular days it must have seemed in a state of utter confusion, boys wandering about in all directions apparently under no supervision, and often to all appearances with no purpose. A party might be met with a jam jar and fishing-net near the river ; others might be found miles away on bicycles, going to a place where some particular flower might be found. Three or four boys would appear to be smashing up an engine and scattering its parts in all directions, while others could be seen wheeling a barrow-load of bricks or trying to mix a hod of mortar. Gradually a certain amount of order appeared, some experiments were tried and found to work satisfactorily, others failed, and investigation into the cause of failure had to be carried out. As the final day approached excitement increased, frantic telegrams were sent to know if the ' liquid air ' had been despatched, frequent visits to the railway station were made in the hopes of finding some parcel had

arrived, sometimes it was even necessary to motor to Peterborough to pick up material which otherwise would arrive too late. A programme giving a short description of the experiment or exhibit had to pass through the printer's hands. At last everything would be ready; occasionally, but very seldom, an experiment had to be abandoned or another substituted at the last moment.

Here we will give a summary of the programme for one conversazione:

## EXPERIMENTS AND EXHIBITS IN PHYSICS

### The Standardising Laboratory

Room A. *High Voltage Experiments*

Induction coil.
Tesla coil.
X-rays.

Room B. *Radium Experiments*

Cloud apparatus showing the expulsion of atoms of helium from radium.
Electric discharges through rarefied gases.

Room C.

Projection polariscope.
Accurate spectroscopy.
Quartz spectrograph.
Constant deviation wave-length spectrometer.
Absorption spectra.
Colours of thin films.
The phoneidoscope.
Bending of a thin beam.
Ripples.

Room D. *In the Machinery Hall*

The mirage.
Singing flames.

Rijke's sounding tube.
Electromagnetism.
Prof. E. Thomson's repulsion coil.
Dorman engine.
The Wimshurst machine.
Coupled vibrations in mechanics.
Strength of materials :—
(*a*) 1½-ton testing machine.
(*b*) 5-ton testing machine.
(*c*) Ewing's extensometer.
(*d*) Brinnel hardness tester.
' Water hammer.'
Cartesian diver.
Pepper's ghost.
Optical illusions and other experiments.
Continuous wave (C.W.) wireless telegraphy.
Long-wave receiving set.
Resistance amplifier of high-frequency oscillatory currents.
Amplification of telephonic currents.
Lodge's resonant jars.
Hertz experiments for the production of electrical waves.
Wireless telegraph sets.
Mobile field station spark sets.
The Duddell singing arc.
Three-electrode valve giving oscillations of musical frequency.

*In the Engine Room adjoining Metal Workshops*

Horizontal steam engine.
De Laval steam turbine.
30-h.p. gas engine for gas or petrol.

*On the Field, near the Armoury*

90-h.p. Curtiss aero engine.

*Outside the Science Block*

Anzani 3-cylinder radial engine.

*On the Rectory Field, near New Foundry*

Jap 2-cylinder engine.

### Workshops

The workshops will be open for inspection :—

Metal workshops.
Wood workshops—entrance from churchyard.
Forge.
Foundry on rectory field—opposite the science block.

## EXHIBITS AND EXPERIMENTS IN CHEMISTRY

### The Chemical Laboratories, Lecture Room, and the Old Forge

The concentration of minerals and coal by froth flotation.
Experiments with liquid air.
Manufacture of liquid air.
The electrograph.
Manufacture of coal-gas and its by-products.
Distillation of coal-tar. (In the Old Forge.)
' Working up ' the coal-tar products.
Coal-gas stripping plant. (In the Laboratory and in the Workshops.)
Pigments.
Preparation of other organic bodies.
The Diazotype photographic printing process.
Mercuric thiocyanate—' Pharaoh's Serpents.'
Illustration of the manufacture of alcohol from starch.
The etching of glass.
Electrolysis and electroplating :—
(*a*) Copper.
(*b*) Silver.
(*c*) Nickel.
(*d*) Electrotyping.
Use of indicators.
Diffusion apparatus.
Deposition of silver on glass.
Determination of molecular weights :—
(*a*) Victor Meyer's vapour density apparatus.
(*b*) Beckmann's freezing-point apparatus.
(*c*) Eijkmann's depressimeter.
(*d*) Beckmann's boiling-point apparatus.
Manufacture of soap.
Manufacture of sulphuric acid.
Invisible ink.

Gas analysis :—
(*a*) Hempel's apparatus.
(*b*) The Orsatt apparatus.
The silica garden.
Manufacture of nitric acid.
Flame tests and borax beads.
Fixation of nitrogen.
The Le Blanc manufacture of sodium carbonate.
The making and manipulation of glass.
The distillation of wood.
Smelting of ores.
Emergency cupola furnace.
Cupellation of silver.
Manufacture of metallic calcium.
Manufacture of caustic soda (Kastner Kellner electric process).
Manufacture of bicarbonate of soda.
Thermostat.

## GEOLOGICAL EXHIBITS

Local geology.
Physical and speculative geology.
Economic geology.

## EXPERIMENTS AND EXHIBITS IN BIOLOGY AND AGRICULTURE

### I. The Lecture Room

1. Local weeds, their dispersal and eradication.
2. Grasses valuable for agriculture.
3. Fungoid and insect pests of crops and fruit.
4. Chemical experiments with plants.

### II. The Laboratory

5 and 6. Bees.
7. The ' Salmon Disease ' (Saprolegnia).
8. Water plants, and their adaptation to environment.
9. Seed-testing.
10. Forestry.

11*a*. The significance of bacteria in the farm food cycle.
11*b*. Soil.
12. Eggs and larvae of rare fishes.
13. Biology of the nervous system of the Chordata.
14. The education of animals.
15. Digestion.
16. The cycle of matter in life.

III. The Museum

17. An ' Index Collection ' of the animal kingdom.
18. The diseases of animals.
19. The development of the frog.
20. Wool.

IV. The Botanical Garden

21. Plant-breeding cages.
22. Marsh and water flora.
23. The apiary.

V. The Experimental Farm

Field A.—6 acres.
Field B.—20 acres.
Field C.—7 acres permanent pasture.
Poultry.
Ducks and Geese.
Pigs.

The conversazione was in itself of great interest and was impressive, but the real value from the educational point of view lay in the preparation. To the boys taking part the work was in the nature of ' research ' ; difficulties cropped up which had to be overcome, apparatus had to be designed. Many of the experiments would only succeed if conditions were exactly right ; these conditions had to be investigated, the boys had to find things out for themselves ; in many cases no exact description of the experiment existed in any book, the experiment might be described shortly and the result indicated, but all the minutiae had

to be discovered by the boy himself. The subjects selected by the boy often gave a valuable indication of the direction in which his thoughts and interests lay, and the way in which he applied himself to the work often revealed unexpected and very welcome traits of character.

At first it was feared the break in the routine might exercise a disturbing effect on the school work, but experience showed that the fear was absolutely groundless. Boys returned to their ordinary forms and classes refreshed by the change in work, and very often with a new or renewed interest in subjects which bore even the most distant connection with the experiments they had been working at for the conversazione.

The work for the Speech Day experiments proved so valuable for the seniors that a somewhat similar adventure was tried with the more junior boys. Sometimes these experiments were in conjunction with the junior literary conversazione, but finally it was found more convenient to separate the two, having the scientific section in the Christmas term, the literary part in the Lent term. The experiments were of necessity of a more simple nature than those for Speech Day, and were generally connected with the work the boys were doing in school, but the experiments were carefully chosen to be of the nature of research to the boys concerned and were not the ordinary routine experiments of school work. Sometimes an attempt was made to illustrate the work of some great scientist, a whole form dividing up into groups, each group taking some historic experiment.

For many years Sanderson was in the habit of inspecting the junior school singing and repetition ; the forms concerned assembled in the Hall, and one set after another was called upon to perform before an audience consisting of the headmaster and Mrs. Sanderson, the masters teaching

the various forms, the boys themselves, and some of the ladies of the school. On the same day an inspection of note-books was held. As the numbers increased it was found impossible to obtain a satisfactory view of all the books in this way; they were therefore assembled in the Machinery Hall and Drawing Office, and could then be inspected at leisure. The introduction of the Library Scheme, the development in the teaching of geography, and other changes in methods added a large number of models, charts, diagrams to these exhibitions, which then became the Junior School Literary Conversazione.

The exhibition was for passers-by. The exhibitors had read and researched. They had converted their results into graphic form intended to be understood even by the heedless. They themselves were passers-by in respect to other exhibits. They discovered that simplicity was better than elaboration. They improved their methods of presentment. They came to have an eye for the essential. Thus, statistics of population were converted into diagrams to show density, curves to show increase, maps to show distribution; accompanying maps, curves, and diagrams showed causes and effects, comparisons and contrasts; and the moral was pointed in few words and large type. Or, the sudden drop in the importation of opium into China was noticed and investigated, presented graphically, its causes discovered and its effects suggested. Or, the nature of the barriers to easy intercourse between China and the West was looked into: the difficulties of language and script; the fundamental differences in mentality; the lack of points of contact in ideals and desires. And on the other hand, the common ground on which is imposed Modern China. Dangers to human understanding and human welfare became apparent. And travellers' accounts led into the heart of Tibet and unknown parts of China.

China Year Books, Japanese State Railway Guide Books, Geographical Journals, Sir Francis Younghusband, missionaries, and Major Bruce, were all used as sources.

The aim set before the boys was to present their material in such a form as to be grasped easily by others. Thus, although each boy studied in detail some parts only of his subject, he became acquainted with the whole ground covered, and himself gave the results of his labours to the rest of the class. Such work was put up in the class-room during the term, and at the end the most useful of it was collected for the junior conversazione.

To the exhibition of work was soon added a variety of entertainments. Some of the boys read papers on some subject in which they were particularly interested ; others gave lectures illustrated by lantern slides or diagrams. These papers and lectures were given in one of the rooms adjoining the main exhibition room and were always well attended, each paper lasting from five to ten minutes. The junior school singing class sang English folk-songs and French songs. Recitations in English, French, and German were given by individual boys. Another diversion which became an important feature in the programme were the ' Plays,' either English, French, or Latin. They were performed on a slightly raised platform without scenery but with a curtain. Sometimes there were home-made costumes, sometimes no costumes ; in any case everything was of the simplest nature so that no elaborate preparations were necessary, and the whole performance would take perhaps ten minutes.

The plays were short and vivid, sometimes lurid. They were often written by the boys themselves. Sometimes they threw into dramatic form scenes from the book read ; sometimes they launched out with more daring, inspired by the lives of such Frenchmen as D'Artagnan, 'l'homme

à l'oreille cassée,' and Landru. The younger the boys the more blood-curdling the play. The MSS. promised a Grand Guignol—the stage gave a burlesque; and all along the actors were producing an accent and intonation less and less like those of an Englishman. The aim of the boys in this was to amuse themselves on winter evenings, and at the end to be in the midst of the stir at the conversazione. And the result was very satisfactory to themselves, and not unpleasing to the master, whose aims were quite other.

In all the plays, recitations, lectures, songs, and other shows the main principle was to get as many boys as possible to take part; if there were too many volunteers for one play, then two might be presented by the form—as many as five have been seen on the same night. Something was certainly found for any boy who wished to take part.

Just as in the plays as many as possible took part, so in the exhibits it was not only the very best work which was picked out but practically the whole work of the form. Naturally the best work was given most prominence, but the indifferent was there. The best boys received encouragement from the praise and attention given to their exhibit. Those whose work was not amongst the best were encouraged at finding their work exhibited; they could receive valuable hints and suggestions by comparing their own work with that of the best boys, and frequently a boy whose work was mediocre one year would be among the best the following year.

The only work which was not exhibited was that which appeared careless and slipshod, as though the boy had not tried to do his best. There was very little such work, for no boy liked to acknowledge to his fellows that he had nothing in the show.

## EXPERIMENT IN OUNDLE SCHOOL

### PROGRAMME OF THE JUNIOR CONVERSAZIONE

#### FRENCH PLAY (5.0-5.20)

*D'ARTAGNAN: MOUSQUETAIRE*

(Arranged by the class, from *Les Trois Mousquetaires.*)

PERSONNAGES

| | |
|---|---|
| D'Artagnan | |
| M. de Tréville | *Capitaine des Mousquetaires du Roi.* |
| Athos, Porthos, Aramis | *Trois Mousquetaires.* |
| M. de Jussac | *Capitaine des gardes du Cardinal.* |
| Cahusac, Bicarat | *Deux gardes.* |
| | *Deux gardes du Cardinal.* |
| | *Un valet de chambre.* |

Scène 1.—*Paris. L'hôtel de M. de Tréville. Son cabinet de travail. Le matin.*

Scène 2.—*Paris. L'hôtel de M. Tréville. L'antichambre. Une seconde plus tard.*

Scène 3.—*Paris. Devant le Couvent des Carmes-Deschaux. Midi moins dix.*

#### CHEMICAL EXPERIMENTS (5.20-6.20)

In Chemical Laboratory

A. Illustration of the chamber process for manufacture of sulphuric acid.
B. Absorption of carbon dioxide by plants.
C. A series of simple experiments on flame and combustion.
D. Specimens of precipitated metallic sulphides.
E. Formation of crystals viewed through a microscope.
F. Decomposition of water by electric current in the voltameter.
G. The ozoniser.
H. Sterilisation of water.
I. Water-softening.
J. Producer gas.
K. Salt-making.
L. Smelting lead carbonate and bismuth oxide.
M. Rose's fusible metal: its use in stereotyping.

## CURRENT EVENTS IN NATURAL HISTORY (5.20-6.20)

### The Biological Laboratory

1. The occurrence of weeds in the botanical garden :—
   Specimens of weeds, named and described.
   Microscopic preparations of seeds and fruits.
   Drawings of salient anatomical features.
   Chart summarising the above features and indicating means of eradication.

2. Animal pests :—
   Living specimens in cases at work ; descriptive notes.
   Microscopic preparations of insects for detailed study.
   Illustrative drawings.

3. Earthworms and their work :—
   The ' wormary.'
   Dissection of the earthworm.
   Microscopic preparations of bristles and sections of the body.
   Notes on action.

4. Chick development :—
   Living specimens, 2, 3, 5, and 7 days old.
   Microscopic specimens for detailed study.
   Enlarged explanatory diagrams.
   Summary of points of interest.

5. Flowers of trees :—
   Branches of flowering trees, named and described.
   Microscopic preparations of individual flowers.
   Descriptive notes.

6. Trout development :—
   Living trout eggs and young fry in aquarium.
   Same under low-power microscope.
   Stained preparations of young trout.
   Descriptive notes and enlarged diagrams.

7. Fertilisation :—
   Section of ovary.
   Pollen grains sending out their tubes.
   Microscopic preparations of fertilisation stages.
   Descriptive notes and drawings.

## RECITATION (6·20)

In Drawing Office

German :—

*Siegfried Schwert*, Ludwig Uhland.

French :—

*Le Corbeau et le Renard*, La Fontaine.

## LITERARY EXHIBITION (*Evening*—8-9)

In Drawing Office

1. R. L. Stevenson's *Travels with a Donkey* :—
   Map of the Cevennes showing route in relation to the contours.
   Geological map showing volcanic formations—Le Puy.
   The Camisards.
   Trappists.
   The Cistercians.
   Scenes from a canoe—from source to mouth of Loire. Essay, maps, illustrations.
   Miscellaneous explanatory notes.
   Original tales and essays suggested by *Travels with a Donkey*.
   Original illustrations to *Travels with a Donkey*.
2. Charts of :—
   Elizabethan writers.
   „ painters.
   „ architecture.
   Foundations of schools and colleges.
3. Drawings :—
   ' Some Famous Books of Tudor Times.'
   ' Things New and Old.'
4. ' The Dutch Wars.'
   ' Life of Monk.'
5. Charts and drawings to illustrate the development of transport :—
   (*a*) Canals.
   (*b*) Roads.
   (*c*) Railways. (See also lecture below.)
   (*d*) Shipping.
6. (*a*) Essay on the woollen industry.
   (*b*) Illustrations of essay on the woollen industry.

7. Heroes of science :—
   (*a*) Richard Arkwright.
   (*b*) Henry Maudslay.
8. Agriculture in the seventeenth century.
9. Wage chart, 1874-1914.
10. Great names in the development of the iron industry.
11. Landmarks in the history of electricity.
12. Chart of the trading companies.
13. Musical instruments.

Lantern lecture, ' The Evolution of Railways.'

## LIBRARY WORK BASED ON ' CAMBRIDGE READINGS IN LITERATURE '

Chronological charts :—

Authors read.
Artists illustrating ' Cambridge Readings.'

Booklets centring round ' Readings ' chosen by boys, *e.g.* ' Lamb's Letters to Wordsworth ' :—

i. (*a*) Short Life of Lamb.
   (*b*) Short Life of Wordsworth.
   (*c*) The Lake District. Maps, essays, relief map.
   (*d*) The St. Gothard.
   (*e*) Calais.
   (*f*) Coleridge.
   (*g*) Essays of Elia.
   (*h*) Verses. Etc., etc.
ii. Original tales suggested by, *e.g.* an episode from
   (*a*) *The Antiquary* ;
   (*b*) *A Tramp Abroad.*
iii. Drawings suggested by ' Readings,' *e.g.* ' Don Quixote tilting at Windmills.'

## UNIVERSAL HISTORY

Maps and illustrations :—

The Early Geological Periods.
Prehistoric Man.
Ancient Empires—Egypt, Greece, Rome.
Mediaeval Europe.
The Reformation.

English History—the Stuarts and Hanoverians.
Modern History—Political and Industrial; The Great War.
One or two informal lectures will be given.

## LIBRARY AND ART-ROOM WORK

### A

The Wars of Charles the Great; and their causes and results: together with maps.
The Norsemen. An account of their social condition and a map of their expansion.
The Predominance of the Roman Church in Europe: together with a map showing the Roman and the Orthodox areas of Europe from 1080 onwards.
The Importance of Towns in the Middle Ages: together with maps showing origins of export from England and origins of imports into England during that period of history.
Early Mediaeval Agriculture: the three-field system. Plan of a 'Manorial Village'; sketches of mediaeval costume of England.
The Age of Discovery.
The Renaissance.
Early Attempts at Colonisation.

### B

A General Problem: the Roman occupation. Map and sketches of remains.
A Social Problem: the life of a Briton before and after the Roman occupation. Map and sketches.
Saxon and Danish England.
The Northmen. An account, a map, and a model.
A Constitutional Problem: the Feudal System; did it work well? Maps and sketches.
A Social Problem: the everyday life of a farm labourer in the days of William I. Model of a manor.
An Account of a Crusade, as it might have appeared in a page of the 'contemporary' Press. With map and sketches.
The Reformation in Europe.
The Reformation in England. Maps and plan of religious houses.
The Divorce of Henry VIII. in relation to contemporary foreign affairs. With map.
The Civil War. With relief map.

## DRAWINGS, MODELS, AND SPECIMENS ILLUSTRATING LOCAL AND GENERAL GEOLOGY

Oil shale and crude oil (Norfolk Kim. clay).
Distribution of oil and allied substances in Great Britain. Map.
Section model of volcano and subjacent strata to illustrate theory of formation of molten igneous rock.
Section to show geyser action.
Geological sections of the Jurassic rocks in the neighbourhood of Oundle.
Collection of rocks and fossils from the Jurassic rocks of Oundle.
Fossils from Quaternary rocks.
Different modes of preservation of fossils shown by specimens.
Collection of British igneous rocks. Map to show ancient British volcanoes.
Model to show alteration of typical river valley features by glaciers.
Collection of common British minerals, with map to indicate where they are found.
Minerals used in glass and pottery industries, with their uses.
Collections : fossil plants from coal measures ; varieties of coal.
Classification of rocks, with examples of types.
Chart to show the geological record and evolution.

## MAPS, CHARTS, ESSAYS, MODELS, ILLUSTRATING LIFE IN INDIA

A. Economic and social life :—

1. Picture map of India showing her resources and activities.
2. Map of Ceylon showing tea and rubber areas.
3. Illustrated article on tea-growing and tea-making.
4. Model of an Indian bullock cart.
5. Model of a rickshaw.

B. Geography and exploration :—

6. Relief map of India.
7. Sketch in sepia of Mt. Everest viewed from a distance of 60 miles.
8. Article on the expedition to Mt. Everest.
9. Map of Tibet to illustrate exploration by Sven Hedin of the sources of the Indus, Sutlej, and Brahmaputra.

C. Religions :—

10. Hypothetical map showing India divided up amongst the chief religions in proportion to the numbers of their respective adherents.
11. Map illustrating the rise of Buddhism.
12. Pencil study of Buddha.
13. The Heart of Buddhism—an illuminated interpretation of the mystic syllables '*Om Mani Padme Hum.*'
14. Model of Selipuk monastery, Tibet.
15. Model of Buddhist shrine—the Thuparama Dagaba, Anaradhapura, Ceylon.
16. Water-colour sketch of the Thuparama Dagaba.
17. Water-colour drawing—the building of Rama's Bridge between Ceylon and India.
18. Maps illustrating the spread of Mohammedanism.

D. Historical :—

19. Map of the Early European Settlements in India.
20. Copy of an eighteenth-century map of India.
21. Map to illustrate the Indian Mutiny.

Diagrams, charts, maps, illustrating the races and natural products of Africa, and suitability of the country for colonisation.

Diagrams, charts, essays, on subjects selected by the boys themselves :—

'Conquest of Mexico.'
'British Birds and Fishes.'
'Life of Drake.'
'History of Everyday Things.'
'The Travels of Mungo Park.'
'Italy and her Invaders.'
'Nelson.'

## WORKSHOPS

The exhibits show a portion of the work which has been attempted in the shops this term.

### *Woodwork*

General carpentry :—

(The work done or in hand includes large tables for the office and for one of the houses.)

Cabinet for storing important small parts of apparatus.

Wheelbarrow.
Cases for balances.
Bed tables.
Machine guns (dummy).

Pattern-making :—
Lathe bed and stands for use in bending tests on beams.
T-piece and elbow pipes.
Brackets for supporting various physical apparatus.
Water dynamometer.
Pulley wheels.
Retort stand bases.

*Metal Workshops*

The following selection is shown :—
Accessories for optical bench.
Adjustable stands.
Milling cutters.
Attachment for extending the range of the milling machine.
Small worms for use in revolution counters.
Terminals.
Wireless valve-holders.
Screw test-pieces for determination of shear strength of screws.
Standard mandrels.
Pressure gauge tester.
V blocks filed and scraped true to surface plate.

Forge :—
Examples of welding.
Horse-shoes.

## MATHEMATICS

The following work has been done this term in ' Continuous Mathematics.' Some of the work is exhibited.
Building estimate.
Company finance.
Level survey.
Electric cable.
Coal mining.
Ship propulsion.
Retaining wall.
Artillery firing. Projectiles.
Steam engine, steam consumption, varying ' cut-off.'

## EXPERIMENT IN OUNDLE SCHOOL

### PROBLEMS ON ELEMENTARY NAVAL ARCHITECTURE

1. Wave form theory. Curves of versed sines and trochoids. Curve of areas.
2. Body plan, and calculation of displacement and centre of buoyancy.
3. Sheer plan, and centre of lateral resistance.
4. Sail plan of yacht. Finding centre of effort.
5. Area of load-waterline plane. Finding the weight per ·01 inch of immersion in the neighbourhood of L.W.L.
6. Midship section of a yacht, and the calculation of its area by—
   (*a*) Simpson's Rule ;
   (*b*) Trapezoidal Rule ;
   (*c*) Planimeter.

Note-books Continuous Mathematics :—
Problem on the school ' bun.'
Problem on the school ' pad.'
Models of solid figures made by the set.
Demonstrations to find surface area and volume of solids.

### FREEHAND DRAWING

Memory sketches.

### MUSIC

Mendelssohn's music to *A Midsummer Night's Dream.*
Gramophone records—the Overture ; Scherzo ; Wedding March ; Nocturne ; and a ' Selection ' including Bottom's March and Fairies' Chorus.
Character of the music : the vivacity and grace of the fairy subjects —humour of clowns' music—the sweet, gentle nocturne.
Comparison with other compositions of Mendelssohn ; his life and principal works ; contemporaries ; influence on English composers.

### ' PROGRAMME ' MUSIC

Imaginative and pictorial music (often called ' programme ' music) has always some ' picture ' or ' story ' at the back of it. It is only when the ' programme ' is known that the music makes its intended and full appeal to us.

Famous examples of ' programme ' music :—

*Edward Grieg's Music to ' Peer Gynt.'*

The story of Ibsen's play and Grieg's collaboration with its author. The orchestra—some information about its constitution.

Records—*Peer Gynt.* Suite No. 1 (Op. 46) :—

Morning Mood.
Aase's Death.
Anitra's Dance.
In the Hall of the Mountain King.

*N.B.*—The second suite (Op. 55), consisting of four other scenes, to be played on the piano, no records being available.

*Tschaikovski's ' Casse-Noisette ' Suite.*

The ' suite,' a set of several short pieces—each with a different character—making a complete whole. The composer's mastery shown in the orchestration. Some investigation among the separate orchestral instruments.

Records—From Suite :—

Overture.
Marche and Danse russe.
La Fée Dragée.
Danse chinoise and Danse arabe.
Danse des Mirlitons.
Valse des Fleurs.

## FRENCH AND GERMAN

Specimens of class work ; dictation and reproduction.
Class work in German reproduction, composition, and grammar.

## EXPERIMENTS

Expansion of Metals :—

Expansion of iron bar.
Expansion of brass ball.
Diagrams showing how expansion is counteracted on railways and in pendulums.
Expansion of compound bar.
Diagrams to show the use of a compound bar in a self-registering thermometer and in compensated balance wheel of chronometer.

Expansion of water on freezing :—
Bursting an iron bottle.
Chart showing value of expansion in nature : Collyweston slates, screes, soil.

The Eye :—
Diagram showing structure of the eye.
Experiments and diagrams to illustrate—
Normal sight.
Short sight.
Long sight.
Blind spot.
Fatigue.
Persistence of vision : stroboscope, wheel of life.
Aids to vision—
The astronomical telescope.
The Galileo telescope.
Simple microscope.
Compound microscope.

Mechanics :—
Various pulley arrangements.
Applications of pulley principle in everyday life.
Experiments on impulse.
The blow of a hammer.
A blow of the fist.
Experiment to measure the velocity of a pistol bullet.
Horse-power of a man.
Foucault's pendulum.
Cartesian diver.

ENGLISH PLAY (9.20-9.40)

*THE MAD HATTER'S TEA PARTY*

(From *Alice in Wonderland*.)

JUNIOR SCHOOL SINGING (9.40-10)

1. ' Auprès de ma Blonde.'
2. ' Marche Lorraine.'
3. ' The Golden Vanity.'
4. ' Robin-a-Thrush.'
5. ' The Derby Ram.'

## § 11. The Cadet Corps

Of the Cadet Corps at Oundle Sanderson himself shall speak. Here are the pencil notes of the address he gave to the first Church Parade of the Corps in 1918. They rehearse the history of the Corps and seek to express the thoughts aroused by the work of that body.

'Therefore have I set my face like a flint.'

'Major Nightingale, officers, and cadets—This is an interesting and unique occasion, for it is the first time that we have held a Church Parade of the Cadet Corps. It was, I think, a happy thought of Major Nightingale to hold it. It is now fifteen years since the Corps was started. It began as a Volunteer Corps and the first commanding officer was Mr. Grace. Mr. Grace left for Osborne after a year, so that the Corps has practically been built up by Mr. Nightingale. In 1908 it was transformed into an Officers' Training Corps, and has expanded from its first numbers of 112 to its present numbers of 411. I may add that it quickly reached a high state of efficiency, and has continued year by year to maintain it and to grow in vigour and life.

'When the war broke out it was found that the O.T.C.'s were of immense value. The old members quickly joined up and were given commissions, and they took an important part in building up the new armies and filling up the old. There is now a steady stream of cadets going forth term by term to take their place in the forces of the country—and they start with a good training, a necessary training of the highest importance. We have no doubt that they form an active and dauntless body of officers full of resource and initiative.

'On Commemoration I shall have to report that as many

THE HEAD AMONG THE PARENTS

as 1000 old boys have joined the forces, and that a long list of distinctions have been gained by old members of the O.T.C.—including no fewer than 3 V.C.'s. This for a young school is highly gratifying to all concerned with the school. There is no doubt that the Corps has worked with zeal, with unremitting labour and activity, with spaciousness, and with the determination to become an effective and efficient Corps.

'And all this training, and energy, and enthusiasm on the part of officers and men is deadly necessary. The country at the moment has before it the grim task of resisting the rush of the enemy forces now let loose by the military collapse of Russia. We may be certain that the nation will "set its face like a flint" and fight until this tyranny is destroyed and the tide flows back, as flow back it will.

'And the force and spirit to do this are shown by a well-trained Cadet Corps. We can see the power in the close-order drill—the spirit of co-operation, of determination to do quickly and well whatever should be done, and not to fail. Each man or boy sets himself to do promptly, accurately, and with precision what he has to do, so that the whole Corps works as one body—each member zealous to be perfect and complete, not one lacking. A great sight. A fine display of co-ordinated power. It is not done without constant devotion. The N.C.O.'s have prepared for it; restless, unsatisfied, determined, they too have set their faces like flint that none of their men shall fail. The mystic power of perfection, completeness—the wondrous irresistible force of obedience to law. A great display of power. Another lesson we may learn from the training of the Corps.

'It is an instructive and pleasant thing to wander about these fields and watch the cadets who are told off to instruct their squads. It is a splendid illustration of the power of co-operation in education—where boys and men,

or where a community work together, teaching one another, learning one from the other, where all are teachers and scholars, a body of co-workers, helping, encouraging, stimulating each other. This community method is dominant wherever there is a great stirring, *e.g.* a great call, a great pressing into a new kingdom; wherever there is a great discovery and a new need. The war will establish it in schools.

'And just one word when you go forth from here. You will carry this mutual co-operative spirit with you. You will love your men, take care of their interests, making full use of their individual faculties, and learn to be co-workers with them.

'It is often said that wars will never cease—that they are a necessity—and in a sense this is true. One thing we know quite well, that in all affairs of life *peace* may be simply the peace of death. There is the peace of lifelessness, of inactivity, notwithstanding all its autumnal beauty. There is the quiet peace which changes not. The conventional belief, the conventional kind of round of work, with lack of initiative, of experiment, of testing and trials. There is the peace which follows on contentment with things as they are. The peace of death. The land of peace and of convention, and of cruel contentment. The land of the dark Satanic Mills—as in Blake's imagery. War may come to break up this deathful peace. So said John Ruskin. I have a letter written to me just when the war broke out. In July 1914 the O.T.C. was inspected by General Birkbeck, and in his speech he expressed his belief that war was coming. On August 2, 1914, he wrote to me:—

'"Dear Mr. Sanderson,

'"We little thought when I spoke to those boys of yours how near we were to our trial!" and he adds:

'"These are the words of a peaceful philosopher, Mr. Ruskin, when concluding a series of lectures on War at Woolwich Royal Academy Institution, which may give you comfort. 'Men talk of peace and plenty, of peace and learning, of peace and civilisation; but I found that those are not the words which the muse of history has coupled together! On her lips the words are Peace and Selfishness, Peace and Sensuality, Peace and Death!!! I learned, in short, that all great nations learned their truth of word and strength of thought in war; that they were taught by war and betrayed by peace—trained by war and deceived by peace—nourished in war and decayed in peace; in a word, that they were born in war and expired in peace.'"

'This is the prophet's call to arise and awake out of sleep; to abandon the easy life of routine and routine's belief. It is a call to rise up and breathe life into the dry bones of the past; it is the trumpet blast for active warfare against all things that have become lifeless and dead. It is the herald call for a new army, to build up a new world of active, creative, dynamic Peace.'

### § 12. Religious Teaching in Oundle School

There is one picture of Sanderson which will never be forgotten by all those who were privileged to be with him in his early times at Oundle. Every day when the school bell was ringing, he was to be seen at the entrance to the Cloisters, with the whole school tide flowing past him; watch in hand he stood, with boys surging round him; he had a word for this one, a nod for that, always ready for any opportunity that might present itself of learning something about his boys which would enable him to help them. Some who saw him thus, day after day, may have thought

chiefly of the watch in his hand, and may have imagined that his thoughts were centred on punctuality; it is true that it was a rare thing for any one to be late in those days, but the headmaster was seeking greater things than punctuality. He loved to tell the story of a certain boy from South Africa who one morning ran past him breathless several minutes after the bell had stopped. The Head declared that he gazed at the boy sternly, but the words with which he was greeted—'Better late than never, sir!'—disarmed him completely. The truth is that he was feeling the pulse of the school, he was learning many things which guided him in after years; he was looking for signs of keenness, enjoyment, boredom, reluctance, and he used to set himself to find out the causes or the justification of these things.

At one o'clock, when school was over, he was to be seen again in the same position; there were always a few boys who had to report themselves to him; they were never kept long—a word of encouragement, an inquiry, and they went hurrying off to lunch at their houses. It is not to be wondered at that most of those who saw these things soon realised that Sanderson was the centre round which the whole life of the school circled. Every moment an individual would leave the stream and dart into the centre to receive instruction, reproof, encouragement, and would then pass back again into the general flow. From the centre an influence radiated, uplifting, inspiring, strengthening; something intangible, intriguing, but very real; something for which thousands of men to-day are deeply grateful.

In later years, when the school had grown and buildings had multiplied, the Head used to deplore the fact that there was no longer any centre in which he could plant himself with the certainty that the whole school must pass him on

their way to class-room or laboratory. He felt that there was danger of his losing touch with the individual boy, but he found other means of meeting the difficulty, and to the end every one knew that individual interests were being safeguarded with the most scrupulous care.

It would be impossible to describe adequately the extraordinary influence which he exerted on all those with whom he came in contact. It affected colleagues and pupils alike ; he could be stern when occasion required, as many a master and countless boys can testify, but the keynote of his influence was helpfulness. He gave every one such an impression of stable strength, of readiness and will to face and overcome any difficulty, and he had the still greater gift of being able to make others believe that they too possessed these same qualities which enabled him again and again to draw strength from the weak, courage from the faint-hearted. Personal influence is an elusive thing ; its reality was never doubted by those who met Sanderson. A father who has had several boys at Oundle was recently tackled by one of his sons in some such words as these :—

' Whenever you go to town, Father, or whenever you return from town, you seem always to try to fit in a visit to Oundle. We have all left ; what is it that still draws you to the old school ? '

There was silence for a minute, and then the father answered :—

' Mr. Sanderson has become a great friend of mine ; I revisit Oundle continually to be able to spend an hour or so with him, because when I come away I always feel the better for having been with him.'

' Well,' replied the son, ' if he has that effect upon you, what effect do you think he had on us ? '

Small boys were a constant source of delight to him ;

he used to say that he found them inspiring. He loved to come into rooms where junior forms were being taken, ask the master to carry on, and move round the desks, looking at the written work and often taking a seat beside some boy whom he would question about his work—why he liked it or disliked it. The answers from young boys he found frank and illuminating, and they had considerable influence upon him when he was drawing up syllabuses of work.

It was with the welfare of the average boy that he was most concerned, and the thing on which he laid the greatest stress was that as much life should be open to him as was possible. Against all repression of the natural boy's instinct to live, to do the work which he liked best, to play the games which he loved most, to be boisterous at times (within suitable limits!), he set his face resolutely. It was an axiom with him that no boy was hopelessly dull; it was his business, and the business of his colleagues, to find out the thing which a boy could do well, and then to see that the boy had ample opportunity for developing his abilities in that direction.

In his first few years at Oundle Sanderson admitted reluctantly that some forms of punishment were necessary, but he disliked them all, and as the years passed his hostility to them grew stronger and stronger. He believed that the trumpery offences of the class-room could be kept in check by vigilance and righteous indignation; if a man put life into his work and inspired his boys to do the same, an occasional 'flare-up' in the case of carelessness or intentional rascality was sufficient to maintain a high standard of keenness in a form; and if genuine keenness existed, nothing else mattered. On one occasion he was asked by an examining board to set a paper in the Theory and Practice of Education. Among the questions he asked

the candidates to justify the statement, 'Never punish except in anger.' The proof came back with a query: Did he not mean, 'Never punish in anger'? He was much struck by the difference in outlook revealed by this inquiry. 'As if I could say anything so silly!' To wait and collect evidence and weigh the facts and pronounce judgment in cold blood was, he held, to make a crime of what might be only a thoughtless misdemeanour. On the other hand to break out, to let oneself go at once, was a thing natural and understandable to a boy. The boy realised one felt strongly; he caught the feeling his offence had roused. There was no long-drawn anticipation of punishment, no rankling memory. He looked on most offences of which a boy is capable as of the 'nuisance' variety, and he believed that the right way to stop these offences was neither to spy for them nor to punish them when detected, but to get boys to see for themselves that a community like a school looks to its members to be loyal and not to fail it in such ways.

The foundation of the relationship between Sanderson and every boy was this—that the boy was sound at heart, and his headmaster believed in him. 'He would admit,' an old boy once said of him, 'that there might be such a perversion as a bad man, but he refused to believe in the possibility of a bad boy.' It was waste of time for any man to approach him with the object of blackening a boy's character; it produced about as much effect as beating a granite cliff with one's bare hand. The inexperienced who attempted to do this learned that it was their business to seek out and to nourish the good points in a boy; they probably heard for the first time the lesson to be drawn from the lawn full of weeds, which man has learnt at last to cure by feeding the grass until the strong healthy growth chokes and kills the weeds which at one time flourished there.

next morning, as Jacob resumed his journey, 'the sun rose upon him.' His favourite chapter of Isaiah was the fortieth, and the verse which appealed to him most was the last: 'They that wait upon the Lord shall renew their strength; they shall mount up with wings as eagles; they shall run, and not be weary; they shall walk, and not faint.' He once told a friend that in the years of anxiety and stress through which he had passed in his early days at Oundle no words of the Bible had meant so much to him as these. He never tired of talking of the Gospels, of the puzzles they contain for us, and the way in which we have not even yet got to the bottom of many sayings of the Master. He brushed aside impatiently doubts as to the feasibility of this miracle or that. To any one who seemed to be worrying about the actual turning of water into wine at Cana he would urge that they were missing the whole point; cold, lifeless water was turned into warm, life-giving wine—and this was the work of the Master and His new teaching. Could they doubt that? He seemed to feel acutely that the passing of the centuries is liable to bring a distortion as well as an enrichment of the Christian revelation, and for that reason he was always trying to meditate himself, and to get others to meditate, on the true characteristics of the Master in the earliest portraits of Him handed down to us in the Gospels.

There are many sayings from the New Testament which Sanderson loved to quote to his classes and to the whole school; for instance, when he was urging on them the value of enthusiasm, he rarely failed to add: 'Give, and it shall be given unto you; good measure, pressed down, shaken together, running over, shall men give into your bosom.' But the words which probably appealed to him most, and which can be seen reflected in his great principles of educa-

tion, he kept continually before the minds of the school: 'I came that ye might have life, and that ye might have it more abundantly.'

His *Synopsis of the Life of Christ* grew from work which he did in his early days in cutting up two copies of the Gospels and pasting them in a large note-book so as to illustrate the parallelism of the Gospel narratives; he prevailed upon some masters and a whole class of boys to do the same. He is widely known for his work in science and education, but he deserves to be equally well known for this Synopsis, and for his book on *Confirmation and Communion*. For the latter he had laid under contribution the Roman Breviary and the early Sacramentaries, together with passages from his beloved Milton and the 'immortal Dante,' as well as collections of prayers of modern Christians so diverse as Pusey, George Dawson, and F. R. Havergal. Those who knew something of his mind did not find it difficult to supply the author in the case of those prayers of which the source is not stated.

He could be fiercely indignant with wrong-doing, but all who lived with him, masters and boys alike, soon learned that the one sin without forgiveness in his eyes was to have no enthusiasm, no desire to 'create.' The wish to be up and doing was what he looked for in all; that it existed in every one he did not doubt, but that it was sometimes artfully concealed he would admit with a twinkle in his eye. For his sense of humour was great. Many a boy will remember gratefully some strained situation which was saved because his headmaster was able to see the comic side of it. Boys loved him because with all his ability, with all his wisdom, he was so intensely human, and because first and last he was their devoted friend; men loved him because of his sympathy, his helpfulness, his inspiring friendship, a friendship which never failed. With all reverence they

would say of him, 'In him was life; and the life was the light of men.'

One contributor who has been reading this book in proof adds the following note:—

'As far as I have read, there is very little in this book about Sanderson's training of his staff. This played no small part in the successful running of the school and the dissemination of his principles. Sometimes he did not seem to select assistants with great care; he was ready to try a man at once on a personal recommendation after a single interview. A desire to teach was a sufficient qualification to begin with, and his acute judgment soon told him whether the material was good or indifferent. He had uncanny ways of knowing whether a man was doing good with the boys, and would take endless trouble to keep him on the right lines, if he thought he would prove worthy. Sometimes his methods seemed harsh to the victims —most of them had to pass through fire and water at some stage—but they came to see that it was ultimately for their good and for the good of the boys. This last was his great criterion for everything.

'He had no formal methods of training his helpers. He seized the opportunity of every chance conversation to sow "seed thoughts" as it were, to encourage initiative, to guide and control where necessary. He would often warn us against doing things in a particular way to "save trouble." "Saving trouble" often meant, so he believed, avoiding something that was valuable or helpful. An extreme instance of this was his refusal to have any index in his *Synopsis of the Life of Christ*. He wished boys to have the trouble of hunting about in the book for what they wanted, in order that they might become thoroughly familiar with its contents.

'As a general rule he did not pay formal visits to the class-room—to some no doubt he went more than to others—but he was glad of an excuse for dropping in while lessons were going on, without interrupting, and liked to find masters standing

while teaching or moving among the boys, not sitting down, as being more likely in this way to keep the form alert. He urged them to discourage slack or lolling postures. If individual attention was required by any boy, he felt strongly that the boy should not be called up, but the master should go round and sit or stand by the boy to give him help. While superintending examinations, we were expected not to correct papers or do work of our own, but wander about and see that the boys were writing their best and taking due care, especially if they were young boys. By this means also he believed that temptations to dishonesty, in boys copying each other's work, were reduced to a minimum. "Do not give them the opportunity," was his maxim—and in the same way he would make it easy for them to tell the truth rather than deal drastically with lying. Not that he condoned mendacity, but he considered individual circumstances, the character of the particular boy, his motive, and the strength of the temptation. Only his wide knowledge of his boys enabled him to do this and to treat each case on its merits. He never missed an opportunity of facing the boys. In chapel he looked straight down towards them, though sitting in the chancel where the staff faced one another. No doubt he learned a good deal from this constant study of their faces.

'His sermons in chapel were, of course, another means of educating the staff, as well as instilling his principles into the boys. But this side of his activities is to be dealt with by another hand in the next chapter.'

## CHAPTER THE FIFTH

### THE HEAD'S SERMONS AND SCRIPTURE LESSONS

THE Head's sermon and the Scripture lesson played a very large part in the essential work of man-making at Oundle School. The two were closely linked; the sermon reappeared in some modified way in the Scripture lesson, and was usually its point of departure. He made very careful preparations, and then for the most part departed widely from his prepared material. He would make first a rough note in pen or pencil of the sermon and then write out what he intended to say in full. He usually had this draft at hand when he preached, but he never read it and rarely followed it. He felt that to follow his written thought too closely would take him away from his congregation back into his study. His draft was his base of departure merely. Sometimes he would pull himself up with, 'But where are we getting? Where are we getting?' turn over a page of the draft before him, and then go off on another excursion. Beyond question his actual sermons and lessons were far richer and more intimate than anything he wrote down. One hearer tells of a sermon he heard, 'the best sermon the Head ever gave.' Next day he asked to have the draft printed. Sanderson had this done, but the best part, the stirring part, was not there. It had been an improvisation, a digression.

After he had given a sermon he would throw the draft into a cupboard in his study. There remain some hundreds

of them. Sometimes he would hunt out these drafts and look them over again and pencil comments and amplifications upon them, and sometimes these comments were quite unflattering to himself. A revised and mangled sermon would serve at times as material for a fresh draft, but he never actually repeated a sermon. That would not have been life, not 'creative'; it would have been 'a dead thing' to do.

He was never a fluent preacher or speaker. He found words an obdurate medium to the end. He spoke in jerks and fragments, and his digressions were amazing digressions. He would go from the story of the rich young man to comments upon Karl Marx or Lenin, to the proposed memorial chapel, to mental wealth and the proper use of artistic ability, to the difference between creative wealth and consumptive wealth, to the possible exhaustion of the coal supply and to the use of other sources of energy. The boys followed these flights with keen delight. There exist several verbatim reports made by boys of these Scripture lessons, and they would be parodied and imitated in the studies. To reproduce such a report would convey a false impression, lacking the magnetism of the speaker it would appear a caricature of a lesson. The point is that the boys listened and thought. And the very boys who imitated the 'Old Man' best secreted beneath their humorous appreciation the most passionate respect; their close apprehension of his quaint rich turns of thought gave that sense of personal possession which is of the very substance of love. The roll of English headmasters has many great names, but few Heads have been such beloved Heads as was Sanderson.

Here is an extract from a letter written by an old boy, now at Cambridge. 'I always felt,' he writes, 'in talking or listening to the Head, that he had two personalities.

The one side of him, the side one met in the actual running of the business of the school, was the immensely strong and capable organiser on whom the working of every single department of the school's life depended. I remember wondering perpetually how it was that, as soon as any boy's name was mentioned, he knew something about that boy, something sharp and clear and personal, apart from his actual work in school. It made you realise that the school's claim that every boy was carefully watched and put to do what suited him best really meant something. But it was the other side of the Head that made the real "Old Man" for us, the side that was always *flashing out*—at prayers, for instance. I shall never forget what a feeling of something missing there was—especially at that time—when he was ill in 1920. It was, I think, at his Scripture class that we saw this other personality, this inner self of the Head, most openly. He always looked as if he was really enjoying himself then—not that he didn't talk very seriously at other times—and the immense gusto (to call it so for lack of a better word) with which he gave us his ideas on every subject that was called up to his mind made you catch something of his fire. I don't think we believed all he said—he didn't mean us to take it for gospel. I believe he often purposely exaggerated and repeated himself so that from the very strangeness of his theories we would want to find some meaning of our own for them. . . .'

The 'Obiter dicta' on page 325 are collected from these lessons, and give some idea of the range of subjects touched upon. In a later chapter we will give together a draft of a lecture as he had it prepared and printed and then a fairly good report of the actual lecture, and the reader will then have some inkling of the entirely *skeletal* quality of Sanderson's written word. But first we will give a few sample sermons as he had them printed or as we found them in MS. in

the study cupboard. The quality of this mass of material is fairly uniform, and these sermons we give are chosen not as outstanding utterances but as representative samples. The earlier ones are generally more normal and orthodox than the later. The reader will note a great development of ideas and charity in the later ones. Throughout his life Sanderson was finding himself and getting free from tradition ; he was adolescent to the day of his death.

Here then are three of the first period sermons, one on St. Antony's Day, one on Family Life, and one a sermon of Counsel on Leaving School. The St. Antony sermon begins learnedly out of note-book and passes into a very characteristic soliloquy. The Head confesses his doubts about himself, his doubts about his effectiveness. In the sermon as it was delivered, and still more in the associated Scripture lesson, this probably became an altogether brotherly intimacy of fresh resolve.

## § 1. St. Antony

'We glory in tribulations also : knowing that tribulation worketh patience ; and patience, experience ; and experience, hope.'

'January 17 is St. Antony's Day. St. Antony is closely connected with our school,[1] and most of you are familiar with the representation of him on the two cups which were presented to the school about twelve years ago. You will find an account of St. Antony in Mrs. Jameson's second volume of *Sacred and Legendary Art*. He was born at Alexandria in Egypt about the year 250, and was therefore in his early manhood at the period of the Diocletian persecutions—the era of the Martyrs, as it is called. He lived a good long life, about 105 years, right through until after the death of Constantine—so that he lived to see Chris-

[1] The Grocers' Company was known in the fourteenth century as the Fraternity of St. Antony.

tianity acknowledged by the Roman Empire, and to see it restored after the temporary rejection in the reign of Julian. He was contemporary with Athanasius, and lived to the date of Jerome's birth. Athanasius became ultimately Bishop of Alexandria, and wrote the life of St. Antony. To this life most of what is known is due.

'St. Antony was the son of rich Christian parents, and was left an orphan with the charge of his sister at the age of twenty. The story goes that as he entered a church to pray he heard the words, "Every one that hath forsaken houses, or brethren, or sisters . . . shall inherit everlasting life." This set him thinking, and next day he entered another church just as the priest was reading, "If thou wilt be perfect, go and sell that thou hast, and give to the poor, and thou shalt have treasure in heaven." A similar awakening is recorded by Augustine of himself, and by many others—and no doubt many are called to newer and better lives by circumstances which appear accidental, and to a certain extent miraculous. In fact, many "starts" in life are given us: the beginning of a term, a new school, a new home, holidays, new surroundings, calls to confirmation, and others less precise.

'Antony received this repeated admonition as a warning voice from Heaven; and went forth, sold all that he had, gave his money to the poor, and with his staff in his hand joined a company of hermits in the desert, and practised the most rigid self-denial. He retreated farther and farther into the desert, and became the head of one of the first Christian monasteries. Much has been written about the rise and effect of monasticism, and you will find severe criticisms in Gibbon, Milman, and even in Lecky. But, after all, we will not be far wrong if we believe that the good the hermits did far outbalanced the evil which may have followed. Their particular practices of self-

denial, their isolation from the world, their self-torture, may not appear to us now as the best examples to set forth when we look for help to live our lives in contact with the life around us; but at the beginning of Christianity some marked examples of the fundamental Christian characteristics may have been required—examples of self-denial and self-abnegation. The hermits held up before the world a lofty, if impossible, ideal, which now strikes us as fantastic, grotesque, and enervating, the essential ideal that to be a Christian required self-abasement, self-denial, and a life of strenuous endurance. This is the fruit of their lives which remains to us. We have to recognise that the ideal of man was raised and transformed by these ascetics and eremites of the desert. It is one more proof of that great truth which seems ever to be forced upon us, a truth of essential importance to us, that our influence does not depend so much upon what we are, but upon what we are endeavouring to be—upon our ideal. It has been said that a nation or people must not be judged by what they think good, but by what they think best. We may therefore direct our thoughts to what the representation of St. Antony in art calls up to us. He wears the monk's habit and cowl as founder of monachism; the crutch is a personal touch representing his old age, and perhaps symbolising the length of life devoted to unselfish service; the bell shows the power of a good purpose in driving away tempters, whilst at his feet lies the symbol of the sensuality he vanquished.

'Such is the outline of St. Antony's life, but I advise you to read it—in a broad and liberal spirit—in the life as given by Athanasius. St. Antony's Day comes appropriately at the beginning of the year, that we may be reminded year by year of what our life consists; and not simply reminded, but that we may receive encouragement and

help in our lives. His life insists upon the first duty given by St. Paul in the passage I have taken for my text. It teaches us to glory in tribulation—it is a perpetual object-lesson of this. Tribulations generate fortitude, resolute endurance under trial; this fortitude leads on to courage; courage in its turn strengthens the hope which has been the source of all. In this, too, St. Paul reveals himself—his inner self—that we through his life might gain our hope. Tribulation worketh patience. The word translated in our Bibles as "patience" means "endurance." It is the same word which is used by our Lord: "He that endureth to the end, the same shall be saved." In your patience—in your "endurance"—possess ye your souls. Accustom yourselves to bear the "hardness" of life—nay, to seek it.

'St. James says, "Blessed is the man who falls into divers kinds of trials, knowing that the testing of his faith will produce the spirit of endurance, and endurance will enlarge and confirm faith." He is speaking to those who have been called, and are trying to lead good lives. To such, trials are essential. They produce the spirit of endurance—not patience as a passive principle which recks not nor cares so long as life is easy, which runs along the easy road, but the *active* spirit of endurance, bearing up against troubles, and ever working for the best. This it is that brings "experience" so that the individual finds his own power, his strength, and accumulates courage for future efforts. It is this endurance and experience which produces "faith."

'I have often thought of speaking to you of faith, but it is a difficult subject. People speak of faith as though it meant blind subscription to a creed. That is a great mistake. The word faith appears more than two hundred times in the New Testament, and only in a few of the later

books does it mean " belief in a creed " ; " faith " generally in the New Testament is what " the fear of God " is in the Old Testament. Faith is to the soul of man what reason is to the mind, and it requires cultivating and training as the reasoning faculty does. Faith is the belief in the ultimate triumph of right-doing ; not a formal assent, but a living belief acquired by endurance, by " hardness " of life. It is belief which is forced slowly upon the individual ; it is the result of experience, of actions tested in the past. It becomes the basis of his future. Upon it rests his belief in the acquisition of all those things which are hoped for, and his belief in the existing of things needed which as yet are not conceived. Faith opens out a new world—and a new world larger than that opened out to us by reason. Faith opens out a wider vista of life, opens out to the view a wider ramification of possibilities, gives confidence to our actions, and leads to yet greater faith and yet wider hope.

' In other words, we are led by endurance in striving for good to make more and more " ventures of faith " ; striking out with more confidence into the unknown, as Abraham struck out for the faith, feeling sure of this—that to those who steadily make the pursuit of good their life-work God will be revealed, and revealed more and more.

' This is hard for you—hard for all of us—to understand ; it has been hard to explain, but perhaps I may have conveyed to some of you what is passing in my mind. The extent of your world—the world you will conquer—depends upon how soon you begin to think of these things ; not, it may be, in the somewhat abstract way I have presented it to you, but at any rate in this way—that you will see now that a call may come to you to sell all that you possess and seek for this one good thing, viz. how to lead a good and useful life ; and that you may carry away this idea—

the idea that surrounding you on all sides, at present unseen by you and unhoped for, are the best and highest things in life.

'There is an enormous waste in life. As we look back upon the past we see the dire effects of time wasted; it may be from culpable negligence, it may be from want of guidance in early or middle life. "Want of guidance!" Does not this remind us of our duty, lest we neglect to direct and guide—at least by our example—those around us? Do we not feel that relapses from "faith" bring discredit upon it, and a cowardly unbelief drags us down and destroys our influence and power and narrows our capacity and wastes time?

'Let us then redeem the time while we may, let us make a fresh start in life, and determine to take up our duties with more earnestness, more vigour, more continuity, with more faith and greater hope.'

## § 2. The Life of the Family

'And He went down with them, and came to Nazareth, and was subject unto them: and His mother kept all these sayings in her heart.'

'In these simple but eloquent words is closed the story of the birth and infancy of Jesus. The story itself is the story of the home life; it is the entering into the holy of holies of the life of the family, with all its depth of mysticism, mystery, its deep and hallowed joy, its joys and dreads, its solemn pathos. The picture takes us to the gentle home at Nazareth, and to the home of the aged devout couple in the priest's house at Jerusalem. There is the coming of a son to each house—the angel whispering in the ear, "Hail, thou that art highly favoured!" There is the meeting of the two mothers, the joyous expectation, the solemnity and dignity of it all. And there is the story of the christening,

baptizing, and naming of the son who would become the companion and friend of His boyhood. There is told in simple narrative the story of the nativity—the holy night and the birth of Jesus: "And she brought forth her first-born Son, and wrapped Him in swaddling clothes, and laid Him in a manger."

'These tender visions of the childhood of Jesus have impressed the imagination of mankind. They are the sanctification of the family life. They are associated with the fondest recollections of childhood, with the music of churches, with carols and the singing of the Waits. The scenes have been painted on the walls of the churches, at the font and over the altar, and around the walls of the cemeteries. Keeping guard over the cottage door, and looking down upon the humble bed, these images of tender beauty and gentle pathos have haunted the fancy of the poor and won their way into the depths of Christian life. And what a revelation these early paintings must have been! The stories of the Bible had passed away into an unknown tongue. All was dark and filled with gloom. Then there came a great preacher—a fanatic—preaching in the palaces of kings once again the story of the gospel for the poor, and there arose men who painted that all might see the scenes in the birth, the life, the death of the Lord. All the ordinary things of life, the simple, everyday happenings, the hardships, the toils, the poverty of life, the days of sadness and the days of rejoicing, took upon themselves a new form! The ordinary life of the family was revealed and sanctified. "Behold, I bring you glad tidings of great joy which shall be to all the people." In these pictures, sculptured in marble or painted in frescoes in their churches, or in humble copies in their own homes, the common folk read the story of the annunciation, the nativity, the appearance to the shepherds, and the angelic

host singing "Glory to God in the highest, and on earth peace, good will towards men," the adoration of the humble shepherds and the learned magi, the presentation in the temple. They saw the child taken in the arms of the aged Simeon and receive his blessing—"Behold, this child is set for the *falling* and the *rising up* of many in Israel"; and they saw what others might not see—the pain strike through the heart of the mother; and they heard too what others might not hear—the aged prophet foretell the coming greatness of the child: "A light to lighten the Gentiles, and to be the glory of Thy people Israel."

'And another picture of child life. The day of confirmation—the child in the temple, the parents missing Him, searching for Him, finding Him in the midst of the teachers, the doctors, hearing them and asking them questions—a picture dear to the heart and to the imagination of all parents. And then we are told He went down with them, and came to Nazareth, and was subject unto them. How fantasy has loved to play with the imagination and dwell in endless mysteries on this life of home—the house of the working carpenter, the boy Jesus learning His father's trade, the shadow of the Cross, the brothers and sisters, the aged mother of the Virgin, Jesus and His cousin John playing together as boys, the lamb and the Lamb of God. In what an infinite variety of ideals is the Holy Family pictured. You can see it all in the pictures we have gathered here in this school. The Holy Virgin, too, has drawn out the souls of great artists. In the pictures you will see of the Virgin, the masters have laboured and prayed to reveal the mother of Jesus. Too gentle she was to them to be human, veiling beneath the radiant form of woman all there is of light and love and immortality. So the masters picture the Virgin in varied symbol—the moon beyond the clouds, the living form of life beyond the dead,

the star above the storm, an image of bright eternity; eyes very wide apart gazing into the mysteries of the future; a mortal shape endued with love and life and deity. . . .

'The Christmas stories are the sanctification of the life of home. They express the enduring fact that the sustaining force of life is the home: love, tenderness, care binding the members of a family together; frankness, patience, forbearance engendering love and confidence and being engendered by them. The home is the reservoir of love in which all trouble will be dissolved, and from which will flow all the water of life freely. Love, sympathy, confidence—these three make the home a castle and a haven of rest; protection from the fiery darts of the enemy, rest and repose from the storms and tempests which encounter every one in the work of life. The serenity of home, the peace of it, the inspiration and power of it! The pleasures in life, the beauties in nature, the joy in games and in all holiday pursuits, the delight in work and the quiet power in the doing of it, are all dependent upon the peace of mind which proceeds from the serene atmosphere of the home. May this peace of God come to us in this Christmas time.'

### § 3. Counsels on Leaving School

'I should like to spend a short time on this last Sunday of term in recalling to your memories some of the thoughts upon which we have dwelt together in this chapel and this year, some of the lessons we have learnt together. Some of you are leaving school, and it is well to gather together some ideas which may be associated with your school life and may possibly be a help to you.

'In the first place, you are going out into the world, and it will be well, perhaps, to consider what that means, and what it is that you are going out to do, so that you may

learn something which may lead you in all your life. It is a seemingly strange fact that amid all the circumstances of life, amid all the stress of life, amid all the perplexities of life—it is strange that the one steady purpose of endeavouring to lead a true life should eventually work out for good. We are told indeed that all things work for good to those who *love* GOD. See to it, then, that you have ever before you the great ideal of righteousness. You are not going out into the world to become lawyers or doctors, men of business or what not, but you are going out to learn to seek the right. In the first place, endeavour to lead a single life ; be not double-minded, unstable. Whatever you have before you to do—do that. Learn to work for the work's sake—do what you have to do with full measure, not counting the cost. Do not weigh your work in the balance with what you think you receive for it. Good measure pressed down and running over is what is required. It is this extra amount which bears fruit in life. It is the part which runs over that is of value.

'Endeavour constantly to purify your purpose of all taint of self. Put away—as far as you can—all thoughts of self, and of self-advancement. As St. Paul tells us, we must consecrate ourselves for others. Let your object be the purification of self. Let it not be simply "getting on," but making yourself better—better in every way, morally and intellectually. Purify your ideals. Keep before you a high ideal. All that a school can give you is this—a tendency towards good ideals, and some of the means by which these ideals are reached and by which your own ideals are purified. If your work in life is mechanical or technical, throw all your energies, all your industry, all your love into it. Don't think that you can give a divided service, that you can do your work without interest, without love—and take your pleasures outside of it. You

cannot serve God and Mammon. Whatever your chief work is, in that you should get your chief pleasure, so that day after day you go gladly and joyously to your work, enjoying it with real unfeigned enjoyment. Now this enjoyment comes by labour, by unremitting industry, by a desire to do your work—whatever it may be—better day by day. At first, and perhaps for a long time, you may feel your work irksome, but it will be irksome in proportion to your own incapacity, and, on the other hand, as your capacity increases, as indeed it will, if you persevere, the irksomeness dies away and you will wander with ease and pleasure through what was once thorns and briers. Beware indeed of thinking that your work is only tolerable because of the pleasures to be gained outside of it. If your work is only rendered possible by the gains within your reach afterwards—or if your duties are rendered possible by other more congenial pursuits—you are living a divided life.

'Let the term time of your life be the happiest part of it—and let your holidays be but a gathering up of fresh force for the work which is the reality of life.

'Exhortations to do your work in the world well may seem very worldly—but they are not so, for we rise indeed upon the stepping-stones of our daily duties, slowly but surely, towards the perfection of life.

'It is by being true to the work before you that you may hope to reach higher ideals of the truth, and a steady endeavour to learn all about your duties must raise your ideals—nay, will transform your ideals, for our progress in life is a series of transformations. Like the sons of Zebedee we know not what we ask, but if we are prepared to drink of the cup that Christ drank of, if we are prepared to be salted with fire, if we are prepared to endure to the end, then the true Kingdom of God shall come to us.

'Now what are the aids to help you in this upward course? Let me remind you of them—of some of those which appear the most essential.

'In the first place—and I think essentially in the first place—is the study of the Bible. I do not say the mere mechanical reading of it. I do not say the steady reading of the Bible through. I do not say the picking out of particular passages, but the regular, careful study of it, with all the material now before us available for its study. It is not too much to say that the help for us is ten times what it was ten years ago. . . .

'A careful study of the Bible is a great aid to meditation: and this meditation or prayer is very essential to a full life. We perish if we cease from prayer. Of course, true, earnest, helpful prayer is difficult. It is difficult to fix the attention, difficult to know what to pray for, what to pray about. Perhaps the best way is to meditate with a note-book. Pray and study. Write down your thoughts. Get your desires and aspirations definite. . . .[1]

'Another great help, to which I have often referred you, is the reading of good literature and the avoiding of light, frivolous, and unwholesome books or papers. Seek to know the thoughts of the great masters of the world. Gather together a library, however small, and learn to love it. You know what Ruskin calls books—King's Treasures. Seek to enter into the possession of these Treasures. Purify your heart, train your intelligence, burn all that is base within you, if your right hand offend you cut it off, prepare yourselves to enter this unknown palace of the King. This palace of a new world is open to labour and merit and to nothing else. No wealth will bribe, no artifice

[1] The study table and drawers, after the Head's death, showed that he practised this method very frequently. There were numbers of sheets of paper with notes and phrases jotted down.

deceive, the guardian of this palace of noble thoughts. In the deep sense, no vile or vulgar person ever enters there. He may read, but he does not enter in. Seek to enter this palace, and in any great moment of your lives, in any act requiring important decision, purify yourselves, separate yourself from yourself, by seeking first the close intimacy of greater minds. . . .

'Another great help—and one you will be often tempted to refuse—is to keep the Sunday as a quiet day. It ought to be a great day for quiet peace. It ought to be a day in which your Bible studies may be pursued, in which your life for the past week is considered and judged, and the scheme for the next week considered. It is not for you who have plenty of leisure for exercise to join in any form of games on that day. All such play as taking photographs or the like should be given up on Sunday. I do not say they are wrong things to do on Sunday, but they fritter away time and attention, they take the place of what is vital and necessary; they rob you of reflection and prayer. . . .

'And finally, when you leave school learn to love your services. I do not say go regularly to church or chapel, but I do say learn to love the services—and then you will not be absent. There is a great power in a common service. There is a great power in losing yourself in a common service. This, like everything else, is a lesson to be learnt. We do not perhaps, all of us, feel the advantage of these services, but the more we take part in them the more we shall feel the great power of a common service.'

The following sermons are later in date than the preceding three, and they show the steady growth of the community idea as the form of incentive that the Head wished to see dominant in the school and in the world.

Gradually it ousted the ideas of self-examination and self-perfection which rule in the three sermons already given, from their priority of emphasis.

## § 4. Behold My Servant

'Behold My servant, whom I uphold; My chosen, in whom My soul delighteth.'

'The book of Isaiah impresses the imagination with the Divine purpose working continuously through the history of His people. This unique purpose—one God and one people—is the predominant thought in the Bible history. A race chosen out from all the nations of the earth to become a peculiar people and to be the messengers of God's Providence to all the world is the dominant fact in all the writings. To explain this startling fact is not possible. The people of God were chosen to be the recipients of a great revelation. True it is—"in blessings I will bless thee." Chosen, too, to be ministers of God to all the world —"in thee shall all the families of the earth be blessed." This was their destiny, this the purpose so vividly seen by the great prophet-master—an eternal purpose running unbroken through the history. Scattered through all parts of the world—only for a comparatively brief number of years did even a small community of them establish a kingdom—bound together by one God, one purpose, one ideal of life, they have been the messengers of the ideal of the sublime in every country of their adoption. Our prophet impressively describes their selection by God in many passages of the book. "Fear not," he says to them in the many lands of their exile, "fear not, for I have redeemed thee; I have called thee by My name, thou art Mine." "I will put My spirit upon thee, and thou shalt bring forth the divine law to the Gentiles." They were

to be collected from all parts of the earth, to be moulded into form by the divine artificer, that they might go forth again endowed with the attributes of the one true God.

'One people with one God they were, and yet a small and despised community in every land. Great empires arose and passed—compared with one of these such a small community was as nothing. Great conquerors like Cyrus had sprouted up, and had led their overwhelming armies to conquer and to destroy. A Nebuchadnezzar destroyed Jerusalem and carried its leaders into exile. Cyrus in the days of the prophets pulled down the Babylonian empire and maintained a state by warfare and conquest. To all the nations he was the type of power, of wisdom, of awe-inspiring force. The isles saw and feared, the ends of the earth trembled; but in the eyes of God these mighty warriors were as nothing, less than nothing, vanity. Startling it is to find that the prophet, too, with the events taking place in his own day, could see that these great kings were only instruments in the hands of God to execute His purpose of rescuing and redeeming His people. Mighty empires, great kings, devastating wars; but the silver streak running through all time remained amongst the people of God—the tradition and duty to rescue, to save, to redeem.

'A nation, a community, to endure in time of prosperity as in time of exile must take on the form of the servant of God. "Behold My servant, whom I uphold"; and the prophet gives the description of the servant whose work remaineth, whose life endures. He describes the characteristics of a nation fit to become the servant of God, the vehicle of the revelation to men. He describes the characteristics of a community whose stock will abide through all the stress of life—for its roots are deep planted in the earth, watered with the water of life. This ideal

was not the same as that which hovered before the minds of David and Solomon. It was no longer a dream of material prosperity, but simply of being and doing as a community all that a righteous God approved—to fulfil the law of life. "I came," says Jesus, "that *ye* might have life, and that ye might have it more abundantly."

'And again, this is eternal life, life everlasting, ever enduring, ever adding to the life of the world—this is eternal life: to know Thee, the one true God, and Jesus Christ whom Thou hast sent. And this answer to the question, Why are we here? What is life for? is the answer given by the natural world itself—to have life, and have it in abundance; to add to the life of the world, to the wealth, the well-being of the world. It is the answer of physical science—to conserve the energy of the world, to raise it to the state in which it can give best of itself, to prevent loss and waste and dissipation. So a community, a school, a house—to raise the standard of life, to help the weak, to bring all its members within the band of happy workers, so that there may be union, combination, each one feeling that he is a member of a corporation and will sacrifice himself for it. And the life-giving power of a house will depend upon how much it devotes to the raising of the weak. It is well known that progress is retarded by the sluggishness of the general average. A good captain of industry will give his chief attention to improving the capacity of the weaker of his workers, to increasing their output. To give attention solely to improve the expert is to lose in the contest—to leave an inheritance of weaklings. A good shepherd will leave the ninety and nine in the wilderness and go after that which is lost—*until he find it.*

'And some perhaps would be happier if they thought more of the welfare of others, if they loved the community more in which they were placed, in which their lot was

cast, if they sought not for their own pleasures, but sacrificed themselves with a true sacrifice of giving up something, some attitude, some selfishness, for the sake of the body to which they belong.

'"I came not," said our Lord and Master, "to do My own will, but the will of My Father which sent Me."'

### § 5. Calling Disciples

'And He goeth up into a mountain, and calleth unto Him whom He Himself would: and they went unto Him. And He appointed twelve, that they might be with Him, and that He might send them forth to preach, and to have authority to cast out devils.'

'In the Gospel stories we have told to us the beginnings of a small body of workers who are called to be educated that they may help the Master in His work, and carry it forward after He has left them. In the chapter I have read we have a very brief record of their formal call. The Master goeth up into a mountain, and calleth unto Him whom He Himself would. And He appointed twelve, that they might become His disciples and learn of Him and from Him. To them He was the Rabbi, and from Him they were to learn whatsoever He Himself thought was best to believe and to do. Some of them He had called in early days, and sympathetic disciples had brought to Him others of like sympathy, for the club, as it has been called, which was formed at the beginning of this ministry was formed of men and women with the same outlook on life, and the creative work of founding springs out of this mutual support.

'With this measure of common outlook and common standard in the value of things men can pass onwards through the jungle. So does the soul of man, and the soul of a nation too, pass onwards and upwards, and so is the life of a community maintained and fanned into vigorous

activity. Such is the power of sympathetic activity. You know the brief story of the call. And when Jesus was walking by the seaside He saw James and John, and Simon and Andrew, and He called them—for He knew that their spirit was linked to His; even as a master, in his teaching, quickly discerns those boys into whose mind and soul his own spirit has gone out. Quickly he can see that mind is linked with mind, and soul with soul, and spirit with spirit. But to them that are without, all things are done in parables.

'Another picture we have of a still earlier call. "And Jesus turned, and beheld them following, and saith unto them, What seek ye? And they said unto Him, Rabbi, where dwellest Thou? He saith unto them, Come, and ye shall see." And these disciples came and saw where He abode, and they abode with Him that day. They went and abode with Him, and that without fear. They had that rare courage, the courage of vision—that attachment to vision which holds them faithful, and ever makes them more effective as the years roll on—the courage of vision. The commoner kind of courage seems pivoted on the past, it is based on tradition, and as it is strained this way and that it seems to snap at its base at the dread moments in life. It frays, it wears out. But the courage of which I speak is joined to the beyond—joined by an elastic, flexible, yet thin cord, which tightens and grows stronger as the years roll on. So as the years roll on may the soul of man or woman enlarge and spread itself greatly as it pours into the great sea of life.

'For this Jesus called His disciples—He called them that they might be educated, and the Gospel tells how they should be educated, and why. He called them that they might be with Him. They were to be with Him to take of His spirit, and to help Him in His work. Apprentices—

assistants—to help the Master. The spirit of His call was the spirit of a renascence in education.

'And to-day also there is a renascence in education. It is an advance and it is a return. It is a return in spiral uprising to the principles and methods of a succession of past epochs. It is a return to the method of the ancient guilds —and from one of the most illustrious of those ancient guilds we derive—but also it is an advance into new things. We cannot live simply on the past. We take the past into the present. I have been telling some of you that a nation cannot be a live nation if it tries to live on its antiquities. It must take of the spirit of the past, and it must march onwards. The present contains the life of all the past. Nor is the upward flow of life ever broken. Is it not true that no cord of life is ever broken? It may grow very thin and strained, but it never breaks. The old is ever being re-incarnated in the new. New worlds for old; old worlds for new. So with the guilds. A community of co-workers and no competition, that was their idea. It is all based on the system of apprenticeships and co-workers. The apprentices helped the masters in every way they could; even the masters were associated together for mutual assistance and were called assistants. The Company was a mystery or guild of craftsmen and dealers, and their aim was to produce good craftsmen and good dealers.

'To-day in these days of renascence we return to the aim and methods of the guilds. Boys are to be apprentices and master-workers and co-workers. In a community this needs must be. We are called to a definite work, all who are privileged to attend here, staff and boys alike—the work of infusing life into the boys committed to our care. Nor can any stand out of this and seek work elsewhere. Nemesis sets in for all who try to live for themselves alone. They may try to work—but their work is sterile. The com-

munity calls for the energies and activities of all. We are beginning to learn something of what this means. It does not mean an abandonment of the best methods of the past. But it does mean that we have to concern ourselves with the pressing needs and problems of to-day, and join in the work. I do not dwell on this now. My mind goes off to the possible effect of these ideas on the general life of the school.

'The working of these ideas is well seen already in the outdoor life of the school. We see it when houses are getting their teams together to join a competition for a shield, say. We see the mutual help, the voluntary practice, the consultations of the captain with others. We see it in the work in the Cadet Corps. We see it in the preparation for a play—this time, the *Midsummer Night's Dream*. We see it in the new work in the library, and we see it as clearly as in anything in the preparation for a conversazione. No more valuable training can be given than this last—well worth all the many kinds of sacrifice it entails. From it, at any rate, the spirit of competition is, I think, altogether removed. Boys, we believe, set forth to do their work as well as they possibly can—but not to beat one another. . . . I dwell upon these things because we hope that all boys will become workers at last, with interest and zeal, in some part of the field of creation and inquiry, which is the true life of the world. It is from such workers, investigators, searchers, the soul of the nation is drawn. We will first of all transform the life of the school, then the boys, grown into men—and girls from their schools grown into women—whom their schools have enlisted into this service, will transform the life of the nation and of the whole world.'

Next we will give a very characteristic sermon of the Head's later period, his 'Faraday.' This he repeated—an

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unusual thing for him to do. But the boys who heard the repetition say that not half a dozen sentences were the same.

## § 6. Faraday

'The invisible things of God from the creation of the world are clearly seen, being understood by the things that are made, even His eternal power and Godhead.'—Rom. i. 20.

'This passage was suggested whilst reading the Life of Faraday. Faraday's name is very well known to many of you, and many have the privilege of studying the story of his life and work. A great life. The life of a great man. A great investigator, a great discoverer. To him the hidden secrets of nature were revealed. To him God came, and his life unveils the mystery of this coming. Sunday after Sunday, with only one day missed in a long run of years, this great scientist finds his way to a little chapel in a narrow court, surrounded by the houses of the poor, and bows himself before his God. To him it seemed that God must be met in humble solitude away from the intellectual life. God, he thinks, is not revealed to the intellect, but to the spirit; not to the rich, but to the poor; not to the wise, but unto babes. You remember Faraday's portrait:

> "And this, you say, is how he looked in age,
> With that strong brow and these great humble eyes
> That seem to look with reverent surprise
> On all outside himself."

> "Great Faraday, who made the world so wise,
> And loved the labour better than the wage."

'And mighty man he was. Taking him for all in all, says Professor Tyndall, it will be conceded that Michael Faraday was the greatest experimental philosopher the world has ever seen. Nor will the progress of future research tend to dim or diminish the results of his labours. A great revealer he was—year by year the stream of revelation flowed in from the mists of the unknown. And the stream flows on

to enhance and glorify his name—for who can measure the work of his hand ? With what abundant prodigality has Nature given up of her secrets since his day. A hundred years ago Man and Nature as we think of them to-day were unexplored by Science ; to-day a new world, a new creation. Industrial life has developed, machinery, discoveries, inventions—steam engine, gas engine, dynamo—electrical machinery, telegraphy, radioactive bodies, tremendous openings-out of chemistry, biology, economics, ethics. All new. These are Thy works, O God, and tell of Thee. Not now only may we search for Thy Presence in the places where Thou wert wont in days of old to come to man. Not there only. Not now only in the stars of heaven ; or by the seashore, or in the waters of the river, or of the springs ; among the trees, the flowers, the corn and wine, on the mountain or in the plain ; not now only dost Thou come to man in Thy works of art, in music, in literature ; but Thou, O God, dost reveal Thyself in all the multitude of Thy works ; in the workshop, the factory, the mine, the laboratory, in industrial life. No symbolism here, but the Divine God. A new muse is here—

> " Mightier than Egypt's tombs,
> Fairer than Grecia's, Roma's temples,
> Prouder than Milan's statued, spired cathedral,
> More picturesque than Rhenish castle-keeps,
> We plan even now to raise, beyond them all,
> Thy great cathedral, sacred industry, no tomb—
> A keep for Life."

And the builders, a mighty host of men : Homeric heroes, fighting against a foe, and yet not a foe, but an invisible, impalpable thing wherein the combatant is the shadow of the assailant.

' Mighty men of science and mighty deeds. A Newton who binds the universe together in uniform law ; Lagrange, Laplace, Leibnitz with their wondrous mathematical har-

monies; Coulomb measuring out electricity; Oversted with the brilliant flash of insight "that the electric conflict acts in a revolving manner"; Faraday, Ohm, Ampère, Joule, Maxwell, Hertz, Röntgen; and in another branch of science, Cavendish, Davy, Dalton, Dewar; and in another, Darwin, Mendel, Pasteur, Lister, Sir Ronald Ross. All these and many others, and some whose names have no memorial, form a great host of heroes, an army of soldiers —fit companions of those of whom the poets have sung; all, we may be sure, living daily in the presence of God, bending like the reed before His will; fit companions of the knights of old of whom the poets sing, fit companions of the men whose names are renowned in history, fit companions of the great statesmen and warriors whose names resound through the world.

'There is the great Newton at the head of this list comparing himself to a child playing on the seashore gathering of the pebbles, whilst he could see with prophetic vision the immense ocean of truth yet unexplored before him. At the end is the discoverer Sir Ronald Ross, who had gone out to India in the medical service of the Army, and employed his leisure in investigating the ravishing diseases which had laid India low and stemmed its development. In twenty years of labour he discovers how malaria is transmitted and brings the disease within the hold of man. On the day in which he made this great discovery he writes, and in writing makes one muse the handmaid of the other:—

"This day relenting God
Hath placed within my hand
A wondrous thing; and God
Be praised. At His command
Seeking His secret deeds
With tears and toiling breath
I find thy cunning seeds,
O million-murdering Death."

'Amongst these great names there rises to the loftiest height the great name of Faraday. Bear with me whilst I tell you a little of his work. For fifty years he worked in the laboratory of a famous institute, which he himself made famous. Three periods there were of his researches: 1816-1830, 1830-1839, 1849-1860.

'The first set of researches were preliminary. He separated the liquid benzol, a substance which has since formed the basis of several chemical industries, and is manufactured in vast quantities. In 1823 a friend visits his workshop and finds him at work amongst his test-tubes and twits him upon what seemed a "greasy" tube—but next day receives the brief note: "The *oil* you noticed yesterday turns out to be liquid chlorine." And in 1821 he saw the first appearance of the electric motor—he saw a suspended wire revolve under the force of a magnet. Commonplace now, materialistic, but who can measure its influence on the spiritual well-being of man?

'His middle period of investigations was truly heroic. He had battled with the question before him in 1821, in 1824, in 1825, in 1828, and now for the fifth time he fought for victory in 1831. In the last quarter of this year he girded himself with his armour, and marched—a solitary being—into the battle, with no sound of the trumpet, no shout of his exulting companions, inspired by no visible, exhilarating, open foe, but wrestling through the dark night—wrestling until the break of day. Ten great days of creation through the winter term. September 23: "I think I have got hold of a good thing." Third day: "No result." October 1: "Slight effect." Fifth day, October 17: "Think the cause is seen." Sixth, seventh, and eighth days: no record—the calm before the battle. October 28, ninth day: a copper ring turns. Tenth day, November 4: the great fact of induction beyond dispute.

His note-book, kept with punctilious accuracy and neatness —each note numbered and dated and results added : " No effect " ; " No result " ; " Have got enough for to-day " ; " An excellent day's work." And we may in all reverence add : " There was evening, and there was morning, and a day's work was done, and God saw that it was good."

' The note in which he records his beginning reads like a description of the house of God taken from the book of Exodus, and I will venture to read it, even if its subject matter may be foreign to some of you :—

' " Have had an iron ring made, soft iron, iron round and $\frac{7}{8}$ of an inch thick, and ring six inches in external diameter. Wound many coils of copper round, one half of coils being separated by twine and calico ; there were three lengths of wire, each twenty-four feet long, and they could be connected as one length, or used as separate lengths. Will call this side A. On the other side, but separated by an interval, was wound wire in two pieces, together amounting to about sixty feet in length, the direction being as with the former coils. This side called B. Charged a battery of ten pairs of plates four inches square. Made the coil on B side one coil, and connected its extremities by a copper wire passing to a distance, and just over a magnetic needle, three feet from wire ring, then connected the ends of one of the pieces on A side with battery ; immediately a sensible effect on needle. It oscillated and settled at last in original position. On breaking connection of A side with battery, again a disturbance of the needle."

' And the veil of the temple was rent.

' On November 24, 1831, only eighty-two years ago to-morrow, he communicated a paper to the Royal Society. On November 29 he wrote to his friend : " To-morrow is St. Andrew's Day. We are here to rest. I have been working and writing a paper, and that always knocks me up

in health, but now I feel well again and able to pursue my subject, and now I will tell you what it is about."

'Thus ends the great conflict.

'Two quotations and I am done. To the description of an electric machine from which have developed all the forms of electric machinery we know to-day he adds :—

'"I have rather, however, been desirous of discovering new facts and relations dependent on them than of exalting the force of those already obtained ; being assured that the latter would find their full development hereafter."

'And this the man sprung from a humble home in the moors of Yorkshire, the small village of Clapham at the foot of Ingleborough ; born in the poverty of South London, and living with his parents in 18 Weymouth Street—off Portland Place, the abode of the so-called wealthy.

> "So simple and so sage.
> . . . Looking with reverent surprise
> On all outside himself. Turn o'er the page,
> Recording Angel, it is white as snow.
> Ah God, a fitting messenger was he
> To show Thy mysteries to us below."'

## § 7. The Garden of Life

> 'And the Lord God took the man, and put him into the garden of Eden to dress it and to keep it. And the Lord God commanded the man, saying, Of every tree of the garden thou mayest freely eat, but of the tree of the knowledge of good and evil, thou shalt not eat of it ; for in the day that thou eatest thereof thou shalt surely die.'

'Practically all nations of antiquity, and even to-day the majority of people, place the golden age at the beginning of things. Right back in the coming of things the earth, men imagined, gave its fruits spontaneously and abundantly, and man lived a life of happiness, of purity, free from what men call sin, free also from sorrow and care, a life without

toil and drudgery, a sunny, empty life. A natural enough belief which is based on a scientific truth—for sorrow, care, labour, vision, the urge of life, the struggle to know more of life, the intensity of the urge to mount upwards, is all in proportion to our growth in knowledge. It is a drastic fact that where there is no law there is no sin ; where there is no supreme effort of life to know more of life there is death and not life. When there is no creative desire there is placid or truculent contentment and confidence. But the true measure of value is upwards, and yet to be attained. Man descends into the depths, that he may find the true source of life, and the path to true life. In successive stages of ascent does the individual man or woman mount upwards ; in successive stages of supreme struggle has mankind mounted upwards—and will continue to mount. Deeply obsessed with the belief in the progress of man, the writer of this earliest and most intuitively true book of the Bible draws an idyllic picture of the making of man.

' God had created man, and had moulded and fashioned him, and had breathed into his nostrils the breath of life, and man became a living soul, possessed of the divine and eternal indestructible spirit, the God-like spirit which would even fill him with the glorious and life-giving spirit of unrest, of unsatisfied longings and desire, of the instinctive natural urge to have more of life. A mighty power, a dynamic creative force, a daemonic unceasing urge—against which the forces of hell, of destructiveness, of caprice, of lawlessness, of the jungle, cannot prevail. Under this power man and the races of men progress : but without this mental fight, this constant struggle, no life can come. I dwelt on this fact last time I spoke to you, having in mind the mental or intellectual aspect of it, especially for those of you who are working for some searching examinations : for without a persistent, painful, and often enough

disappointing effort the understanding of things will not come to you, or to any of us.

'Be true to yourselves, suffer no artifice, or artificial understanding, to throw dust in your eyes. Do not struggle for a static victory. Be true to yourselves. Do not struggle for your own recognition, as it were, or for the mere appearance of knowledge—rather struggle to enter into the kingdom, the kingdom of service.

'And where can you find the inspiration and urge of life? The source is wonderfully drawn out for us in the illuminating and suggestive commentary on Genesis you have the advantage to study. A great human book is Canon Driver's *Commentary,* digging out for us the deep truths of life embedded in the ancient myths of Genesis. A study in the use of words; of what we can learn from words; a new form of text-book. Such a text-book as we should have for the new era. This picture of the coming and making of man tells us a story of the widest applicability. It is found in all the works of God; it is found in all our surroundings; it is found in all our work and toil; it is found most fully and actively in our daily working life. God we are told made a garden for man, and there He placed him, and gave him charge of it; and there the Lord God came and walked with man, and communed with man, and breathed into his nostrils the breath of life. And there He gave him his chief aim of life, his one purpose. And the Lord God took man, and put him in the garden of Eden, to dress it and to keep it. And then with the memory and order of that garden in his mind He permitted him to receive knowledge and then sent him out into the great wilderness to find his garden there.

'As Canon Driver says, "Man is not made simply to enjoy life; his end is not pleasure; nor are the things he has to do necessarily to give pleasure or lead to what men

call happiness." This is not the biological purpose of man. His purpose or instinctive end is to develop the capacities of the garden in the wilderness of nature; to adapt it to his own ends, *i.e.* to the ends of the races of men. Or, as we would now say, his aim is to take his part in the making of his kind; and he is to "keep it" or guard it—*i.e.* he is to conquer the jungle in it, to prevent it from roving wild again, from reverting to the jungle, from losing law and order, from becoming unruly and disorderly, from breaking loose and running amok. He is to bring and maintain order out of the tangle of things; he is to diagnose diseases; he is to co-ordinate the forces of nature; he is above all things to reveal the spirit of God in all the works of God.

'And in all this we read the duty and service of schools. The business of schools is through and by the use of a common service to get at the true spiritual nature of the ordinary things we have to deal with. The spirit of the true active life does not come to us *only* in those experiences we have been so accustomed to think of as beautiful and revealing. The active spirit of life is not revealed simply by the arts—the beautiful arts as they may be thought—of music, or painting, or literature. These indeed may be only and abundantly *material,* and the eye and ear may be blind and deaf to the active, creative, discovering, revealing spirit. "Painting, or art generally, as such," says Ruskin in his *Modern Painters,* "with all its technicalities, difficulties, executive skills, pleasant and agreeable sensations, and its particular ends, is nothing but an expressive language, invaluable if we know as we might know it as the vehicle of thought, but by itself nothing." He who has learned what is commonly considered the whole art of painting, that is the art of representing any natural object faithfully, has as yet only learned the language by which

his thoughts are to be expressed. One language or mode of expression may be more difficult than another; but it is not by the mode of representing and saying, but by the greatness, the awakening, the transmuting and transfiguring conception and knowledge of the thought presented, that the gift cometh, that man is created. Awkward, discordant, stammering attempts may be the burning messages of a new hope. But this "voice" of art is too often drowned. It is drowned by executive skill—as is the history of all art—when this skill stretches itself to present things that are static, motionless, dead.

'Well may the boy say of his lecture on art or literature, "I found it dull." Well may it be that the joy, and the message, is better, clearer, more stirring when it comes through the working in the crafts of say a cookery school. Music or painting is vastly unreal, lifeless, when it has no message—but the elementary crafts carry their message with them. The saving tendency of the crafts is that they tend to remain creative.

'It is especially our duty to reveal the spirit of God in the things of science and of the practical life. Herein lies a new revelation, a new language, a direct symbolism. Science, just like art and music, can be materialistic—science can aim only at mechanical advancement and worldly wealth, which is not wealth at all—just as art can aim only at pleasure, desire, and drawing-room appreciation. But this need not so be. Certainly no one in a responsible position can teach science for long without the coming of the revelation of a new voice, a new method of expression, a new art—revealing quite changed standards of value, quite new significances of what we speak of as culture, beauty, love, justice. A new voice speaks to the souls of men and women calling for a new age with all its altered relationships and adventures of life.

'With eyes opened to this new art you can wander through the science block and find in it all a new Bible, a new book of Genesis. So we believe. This is our duty and our faith. Into this Paradise have you been placed to dress it and to keep it.'

## § 8. Creative

'In the beginning God created the heaven and the earth. And the earth was waste and void; and darkness was upon the face of the deep: and the Spirit of God moved upon the face of the waters.'

'The Bible—the Old Testament and the four Gospels—is the greatest creative book in the world. It is made up of books which have been written at periods spreading through at least a thousand years. They were selected and entered into this creative book at three or four definite epochs, and each book passed the touch-plate of creativeness. It is the most unique history there is, and ought to have been the standard of all histories. It tells the story of the creation of the world, of the coming of man, and of the coming of life to man. It shows how a people has been selected, tested, trained, purified, and built up into a kingdom of priests, a peculiar people. It is the life-history of a boy; the life-history of man; it is the inspiration for all school life.

'In the beginning God created the heaven and the earth, and the earth was waste and void. The world was in chaos, darkness, and gloom. But it was not to be left in this state. All this condition of anarchy, this waste and void, was the material out of which a new world was to be created. Confused and impossible though everything appeared, yet there was something present that made steadfastly and incessantly for order. So we believe it is now, in the present state of things. All the conflicts and strifes of to-day are

the breaking up of the fallow ground. They are the effort to create life. They are the messengers of the coming of the Son of Man. In storm and tempest cometh the Son of Man. Over all this lawless, shapeless, impossible material of Chaos there brooded, we are told, the Spirit of God. The Spirit of God was brooding over the waters like a bird over its nest, and in due time, in the order of creation, a new life was to take shape, and a new world was to rise up. In stately, ordered, majestic manner, with all the certainty and irresistible power of gravitation, step by step, stage by stage, out of the welter of anarchy, a life—a new life—was to come into the world. A new life came.

'And at each stage we hear the words of the Lord God, "Let there be," and "there was." And then: "God saw that it was good." There was evening, and there was morning—darkness changed into light—and the day's work was done. And God saw that it was good.

'So too it is and will be in the history of the human race. The uplifting of mankind, the coming of fuller life to nations, to man, to classes and sections of men, has come in epochs of change. Such stages in history are like the stages in the life-history of a plant. There seem to be resting phases, epochs of apparent quiescence, the cessation of struggle, of labour—a period of apparent quiet, the solemn quiet of anarchy, of determination, of the spread of belief.

'The fact is that some new freedom, some new principle of life, some new desire to grow, has for a long time been taking root in the minds and souls of men. The urge to become more creative—to gain more of life and to give more of life—becomes at last intense. And there is an immense desire to satisfy the great urge of nature. The old order passes. The gathered forces seek release. The pangs of birth are upon us.

'May I explain it in this way? In this school we do not believe in suppression. We believe in the creative urge. Our belief is that every one of the boys in the school has a tremendous desire to do something, and to do it well. If all things do not seem to go well, and the boy may even seem to be rebellious and bad, our experience is that this seeming idleness and badness is due to "unused talent." We need not trouble ourselves with the faults and badness. We must seek out the thing that is good, the desire to grow and to give life and service. This desire we believe is the fundamental creative instinct. We must nurse this desire. We must prepare the ground for its use, and its expansion and satisfaction. We must have the stupendous faith that what in the boy seems often so wanton, so rebellious, is only the unsatisfied desire to do good, to make, to create and give of life. This is fundamental to our idea here.

'And another fundamental thing is to be got also from the Old Testament and from the Gospels—not, as I think, from the Epistles. It is our duty towards our neighbour. It is high creative "Love." It is this: What we believe of ourselves, or of our sons, we must believe of the mass of mankind.

'Whatever the facts are in a boy which drive us from the belief in his urge to do well, to work, to create, we are to believe that the desire is there—and we are to prepare the "garden" for his use, we are to search out and nurse his talent.

'So with the man of labour; so with the miner. We may drive a boy to do what we want, but we do not thereby make him a creative soul. We make him a creative soul by giving freedom and light to his own will.

'Love has been debased into a kind of debased love—possessive—"Charity." No love can be given except by the giving of life. We cannot give life to our boys by a

simple gift. We cannot buy life for them and pass it on to them. No creative thing can be bought.

'As with the boy so with Labour. We must have immense faith in the best desires of the worker. A golden rule in our school is this, "Never have a 'fault' of a boy accentuated." No speaking lightly, disparagingly, against the faults. Let a boy be known by his best deeds, not by his misdeeds. You well know the value of this. So do many of us believe that it should be for Labour—against all annoyances, losses, all appearances.

'We must not say that young life at school is different from adult life at work. No, a school is the world in miniature. We are to create in the school a microcosm generally of the new world that is to rise up out of all this chaos.

'But two things need to be said here. In our social relationships, in our love, economics, politics, we must take our analogies, our lessons, from physical science. Physical science and religion always act and react on each other. Two great discoveries have been made. One is the discovery of radio-active atoms. The other is the discovery of relativity. Both are needed for the new world.

'Individuals are not hard Newtonian molecules. Individuals are like atoms under radium. The life within a man or a woman, a boy or a girl, is the most powerful, vital, complex, energetic thing there is. It cannot be treated as a "hard" molecule any longer. There are vast stores of energies to be liberated.

'The scientific work before the world is to co-ordinate, to *harness* the radio-active souls of men, just as we have to harness the energy of the atom. This is the stupendous work for which you boys are to be prepared: in the existence and needs of which you have to believe.

'And for this the centre of gravity must be changed.

The viewpoint must be changed. Astronomy was once looked at from the earth as the fixed centre of vision. Through much conflict and many persecutions the viewpoint was changed to the sun—the sun a fixed star. Then the sun began moving. It is now changed to an "atom," shall we call it, of light, moving with the velocity of 186,000 miles per second. And the new things must be viewed from that moving chariot of light.

'And we have this great sacrifice to make. It is, we may well believe, the only sacrifice commensurate with the sacrifice our sons made at the Front. It can only come by great effort—by a change of belief. Nothing easier than a change of belief can do it. A change of viewpoint. A constant change from Static to Dynamic. A change of economy, of morals, of all that is—there is nothing that will not need to be rewritten under it. A new mount of God. A new vision. A new Horeb and Sinai. A new Mount of Transfiguration. "And after three days He took with Him His disciples, Peter, James, and John, and went into a mount and was transfigured before them." So, too, if we are to see a new world arise out of this conflict and strife, we also must go up into the mount—the new mount of vision.

'See, boys, that you make it after the pattern which hath been shown you on the Mount.'

## § 9. The Call

'Now the Lord said unto Abram, Get thee out of thy country, and from thy kindred, and from thy father's house, unto the land that I will show thee: and I will make of thee a great nation, and I will bless thee, and make thy name great. So Abram went, as the Lord had spoken unto him.'

'To-morrow is the day of School Confirmation. A call is made to all who have come, as the Prayer Book says, to

years of discretion—when you can understand and hear the call. The whole school is assembled to take the oath of a commission—for you are all asked to join a service. You are asked to choose whom ye will serve. You have come, many of you, to a special epoch in your lives—to the parting of the ways—when you feel yourselves day by day called upon to decide which course you will take; at an age when you are naturally still in an unstable state, halting in many things between two opinions. You know within yourselves that you are now called to select your way. The demand has come to you: "Choose you this day whom ye will serve."

'What choice will you make? What is going to be the ideal of your life? What is your creed of life? What do you believe? What do you believe to be the best worth knowing, doing, living for? This is what you are asked to choose. You have been thinking of these things, and to-morrow in a solemn ceremony you will be asked to confirm and record your choice.

'Shall your names be enrolled on the roll of honour amongst those who have chosen to strive in all things that their lives shall be robust, manly, healthy—in games, in school, and in your house? Shall your names be enrolled amongst those who lead the school in some one or more of its various activities, taking an intellectual interest in your pursuits, taking a pleasure in all things of good report, straight, honest? Shall your names be remembered amongst those who have enriched the school by the dignity and nobleness of service? The call comes to you: "Choose you this day whom ye will serve." And, boys, the call for noble service now in these days is great and long. The harvest is ready—the labourers few.

'"I came that ye might have life, and that ye might have it more abundantly." This is the purpose of life. To make

the most use of ourselves for the welfare of others; to make ourselves more efficient, more capable of adding to the well-being of the world—this is life. The call for service is great. To advance the knowledge of things; to add to the safety, resourcefulness, and well-being of the world; to relieve the hardships and distress in the world, by sacrifice, by labour, by attitude of mind; to join with those who love the pure and the beautiful—this is life: the harvest truly is plenteous, but the labourers few. And the call comes to you to go out into this new country, for this old world is always new, to become pioneers of new ideals of life, to sustain your belief in the Divine. This is what you are asked to ratify and confirm and acknowledge yourselves bound to believe.

'But you are asked to do more than this—you are asked to act, to *do*, to keep all the commands of God. Not to *believe* only, but to do: not to have visions, ideals *only*, but to possess and develop character, the capacity for doing. To believe and to do—this is what you are asked to ratify and confirm. To know what to do and to do it. To become expert in doing, to be a craftsman.

'It is, as you well know, an inspiring and beautiful thing to watch a great craftsman, whether in his work or in his sport. A great craftsman, I say—one who loves what he has to do, and does it well, and in the right form; *well*, not as if the manner of doing it was of no matter. You see him handle the old material—and lo! it springs forth and buds alive. A craftsman—one who by careful training and self-denying exercise; by upbringing; by unremitting practice; by love of the thing—keenness that the thing should be done well—has brought his faculties under his command; disciplined himself like a gymnast. He does difficult things with ease, and with apparent absence of effort. You watch him as he seems to play with his

work, bringing out from his storehouse of knowledge and of life experience, with delicacy and lightness and certainty of touch, lessons for life. The subject of his work—however dull it may seem, however dull it will be in the hands of an indifferent, uninspired exponent—is in the hands of the master ablaze with light and life—with lessons for life, inspirations for life. A true craftsman, a true builder—fit to build the temple of God. Again, the craftsman, the man of character, capable of doing, works with certainty and with definiteness of purpose, as he works whose soul is pure. We watch him at his work—the exactness of it, the completeness, fullness; nothing left out, nothing dead, nothing uncertain, hazy; nothing left to chance, all wrought with punctilious care and accuracy. Law and obedience, form and beauty of love—in all Thy works, O great Master! It is the power and beauty we see in the heavens, the power of perfect obedience to law, the majesty of prompt obedience to the call, it is *that* obedience which is perfect liberty. And this inspiring Master Craftsman is a gentle, loving, sympathetic soul—attracting all akin to Him, transforming and strengthening the weak, building them up after His own image. For the true craftsman would live again in his own children, and you see him with friendly care watch over them, direct them, foster them, know what they are doing because it is in the plan; encourage, control, raise, impress them with the dignity of life. Such the Great Craftsman above us, such the craftsman we would love to be.

'Well, to-morrow, boys, you will receive the message of the call—call to ratify and confirm two things: what you shall believe best, how you will best do it. To-morrow you are called to believe—to become great idealists; you are called to do—to become great craftsmen, men of character; to learn to obey, knowing that obedience will set you

free. The call to noble service should be easy to follow now—the call to life of love and self-sacrifice and forgiveness should be easy now. Now, when there are such great numbers giving their lives for their country, the call should be easy to obey. What can I do for my country ? say the young. The answer is near at the gate. You will be asked to ratify and confirm it to-morrow. You can believe, you can do. Like St. Christopher, you can go forth in search of the greatest master, the noblest, purest ideal and purpose of life ; you can escape from the weak or bad and unworthy who would flatter you, tempt you into an ignoble service ; you can join the service of the Great Master and do His work.'

## § 10. I WILL NOT LEAVE YOU DESOLATE[1]

'I will not leave you desolate, I will come unto you.'

'Whitsunday—White Sunday—white, pure, untainted—day of consolation—day of inspiration—perhaps the most joyous time of all the year. Spring in its power, life, Spirit of Peace, joy. Everywhere joy—sanctified, subdued. Joy, and peace, and new life in the music, the harmonies and discords, of Nature—here, in the country. The singing of the birds, their twittering, chattering, calling ; their excitement ; their restful chirping, abandon of joy, peace without alloy—they are friends of the soul. The atmosphere too—the gentleness of it, the life within it and soft warmth of it : freedom, imagination, inspiration are in the air ; the wind bloweth where it listeth. Joy, innocent, white, pure, and happy. Happiness too. Life steeped in the sunshine of happiness. The spring, the elasticity, the eutrophy of life :

[1] The notes of this sermon are rather broken. It seems to have been delivered about a month after the Head had heard of the death of his eldest son, Roy, in France in the battle of the Lys.

life-creating life; life-giving life. Happiness on every hand mystic, elusive as the forces of Nature. "The wind bloweth where it listeth, and thou hearest the voice thereof, but canst not tell whence it cometh, nor whither it goeth." Happiness! Not freedom from care, or from sorrow, or from sleepless anguish; not freedom from abasement, not even from dark gloom—the accidie of depression—yet nevertheless the increasing sense of the life of love and service, the power of service, the completeness of it. The happiness which breaks ever and again through the clouds of uncertainties, doubts, darknesses of life—revealing it may be, for a moment, the signs of long years of effort—for as life goes on it is given to catch glimpses of the growth of the soul, something of the part the soul has taken in the building of the kingdom. It is in this life of love and service the words of the Master come to us: "I will not leave you desolate, I will come unto you."

'In these days no one thinks of anything but service. The cry is, What can I do? What service can I give? It is still a time for recruiting to all branches of service, a time of reality, of selection, of survival. It is indeed a time of sifting, the time of the winnowing fan. The nation is preparing to organise its whole population to the highest possible service in a supreme effort. A readjustment is taking place to increase the working capacity of the country. Faced with a paramount need, there is no respecting of persons; each man must be judged by his capacity for the service, must be adjusted to the part wherein he is most capable of using his energies. And each man and woman wishes it to be so. Let us find what we can best do, they say. Nor will there be any difficulty. Each one we may rest sure desires, and desires only, to find the place in which his capacities and qualities are most required. No one stints labour—all are for service. In these days no one can stand idle.

We are learning now as never before the need for abundance of labour, the reality of it, the beauty of it. We are learning now the need for accuracy, exactness, truth. The motto is now indeed, "Whatsoever thy hand findeth to do, do it with all thy might." There can be no such thing as passing muster. The call is for *abundance* of service. In those well-known words of St. Luke—"good measure, pressed down, shaken together, and running over." This shall be our rule. The abundance of it. The beauty of it—for beauty is in abundance. You can see this in the beauties of Nature—how Nature is lavish, and in her abundance is beautiful. And indeed in all work it is the part which runs over which gives the driving force. It is this extra amount added by zeal, love, and enthusiasm—added too by the spirit of thankfulness—which is the life-giving power, the inspiration, that which communicates itself to your higher soul, and to the world outside. It is by abundance that new revelations come. All the great revealers of Nature—the great artists, the great thinkers and discoverers, have patiently given in abundance, pressed down, running over. Read the history of great men; in this abundance lies the beauty of their lives.

'And again consider the exactness, the truth of the labour. No one can know better than most of you boys the vital necessity of accuracy and truth in work. Note the exactness and truth of expression in the work of the great poets, the transmission by art of the secret revelation of things. You love a picture, music, a poem just in so far as it expresses with truth and accuracy and clearness. Or again in mechanical things. We are privileged to take part in the making of munitions of war. We make standard parts. These parts must be interchangeable. They must be true—true to the finest degree of accuracy—interchangeable. And well you know the patience, care, love,

and enthusiasm needed for this. You know well the joy and delight of this precision. A great sight it is to see a skilled mechanic at work—the patience, the gentleness of it, the spirit of love of the true in it, the exactness, not leaving anything to chance, the persistently putting the work to the test, to the proof—proof-plane, gauge, emblems of truth. True labour—no game of chance. True wealth-producing work—no game of chance. True wealth-makers. The beauty of life in abundance and truth.

'And when these days of wrath are passed away, there will be a great battlefield for a new birth. Days of wrath and then a new revelation. When God came down on the first Pentecost on Mount Sinai, He came amid thunders and lightnings, and in a thick dark cloud—and when the Holy Spirit of God came to the waiting disciples there was a sound of a rushing mighty wind. And it must be so. New birth comes through much sorrow. So we may hope that new theories of life which for a century have been growing towards birth will spring forth out of this great contest in all the lands of the earth. Vast work there will be, and the labourers sadly fewer. The nation is now sending of her very best into the battlefield. There will be great call for new recruits to restore the countries which are devastated—great calls, too, for investigators in all branches of knowledge. Pioneers are now leading the way in research, in mathematics, in science, in industry, in the laws of logic and thought, with new ways of expression in language and art.

'There is the great pressing need of revolution in the laws and relationships in the social life. We may have visions of a regenerated social state, in which courtesy, justice, mercy, the spirit of the gentle knight, will show themselves in change of thought, of belief; we may have visions of communities guided by principles which we hope

and believe rule in our great school. Care for the weak; clothing, feeding, housing, medical care for all; a crime to be poor, to be diseased, to be underfed; these regenerations controlled by the true and public spirit at the cost of the community. Laws for reform and redemption, and not for punishment. Each member of the state cared for, as it is our hope each boy of this school is. Great changes—essential to the well-being of a state, and to each member of it. We may have visions that the spirit of chivalry, of kindness, of courtesy, of gentleness, of all that goes to make the "gentle soul" will bring this redemption to the people.'

### § 11. In Rama was there a Voice heard

'In Rama was there a voice heard, lamentation and weeping, and great mourning, Rachel weeping for her children, and would not be comforted, because they are not.'

'On Thursday last I attended a meeting of parents of past and present boys of the school held in the Court Room at Grocers' Hall. It was a great gathering. There had come to it with a determined love, and from long distances, from all quarters of England, parents of all the periods of the school's history during the last twenty-five years. They were all friends of the school—many of them very well known to us as frequent, kindly, helpful visitors in the earlier days of struggle. They believed in the school, but their belief was the belief of exhilarating faith. Under the kindly dew of their sympathy the school slowly gathered itself together in preparation for the fuller stream of life. There was the father of four boys who kept up the succession in Dryden from 1893 to 1901; another Dryden parent from 1896 to 1916—four sons at Oundle, two killed at the Front; the Chairman sent his eldest son in 1900 and we have had a succession of six sons, and the

last is with us now. There was the father of two boys well known under kindly sobriquets—forerunners of a race of boys of the same name, the last still with us. Great faith in those days. There were the parents of the first small boys of the school—who came in 1896. They were in School House, and were taught—often enough in those early days by Mrs. Sanderson—in the old Common Room—that dear, noisy, transparent, transvocal room—now no more. There was the father of the first Berrystead boys—coming in 1905—extending with two sons over until 1913: Hugh and Alan Godsal—and Alan has gone before. There were parents of boys whose names will abide in the life of the school for all time. Their names are recorded in its history—leaders in the school, in its games, in its character. And there were parents of some of our newest boys—men who by their spontaneous zeal, by an eager sympathy with what we are endeavouring to reach, in many cases by the advice and help springing from high expert knowledge, give new zest and new faith to the school of their adoption. The spirit of co-operation is with us, and these parents join in raising the school to the state we would like it to be. And there were the parents of boys who have fallen at the Front—Coombs, Alan Godsal, two Burrells, Carmichael, Hebblethwaite, Ridley, Hopkinson, Bostock, MacBryan, Hooper, West, Platts, Hopkins of Dryden; and as I read out these names pleasant thoughts arise of days gone by—when these boys were still in the school. And our thoughts went off to those who were not able to be present; in an especial degree they were with those who have made the great sacrifice.

'And to pass to some more personal thoughts, my mind went back to the early days, and there came up the memory of the two men, governors of the school, one present, one gone before; men who had stood close by, standing like

the two pillars at the gates of the temple, Jachin and Boaz; and to a great colleague, ever faithful, ever loyal and creative, ever full of humour, who joined in steering the barque of the school in uneasy waters.

'And the parents were gathered together to consider what memorial shall be built for those who have made the great sacrifice. What memorial? We ourselves here know quite well the kind of memorial we must build. To us it is to join in building up a new earth. Our part is to restore the city. . . . What a day of sadness and of gloom this war has brought us to! The enemy is in the land, destruction and desolation on all sides: "Rachel weeping for her children, and will not be comforted, because they are not." But we must not dwell in the valley—we must rise to a life of action, of activity. First there is the determination hard-set to win the war. It has still to be won. So our boys go out. You see their hard-set will upon their faces. Cheerily, manfully, with strength they go out. We say good-bye to them when they start, and we hear the voice of strength as they go. They go—best of boys, they go. They have the capacity of enduring hardness; zealous, true, open, frank, genial souls—earnest of purpose. We know that they go forth to win the war, in life or death to win it. And, boys, what shall you do? You, when the time comes, will do this also. We have no doubt.

'Term by term I have read the Roll of Honour of the school—the names of our boys who have gone forth in the Way and given of their life that a new life may come to all. We know that they are not dead. Not one of them is dead. "If a grain of wheat fall into the earth, it abideth by itself alone; but if it die, it beareth much fruit." Nothing lives except it dies. And we know they live; in one form or another they live, and will come again and abide with us, helping, encouraging, loving—leading us on to a higher life.

So they come again to us—in the deep stillness of the soul, in the solemn stillness of the night, in places hallowed by their presence, in the familiar walks, in the hours of decision, in times of doubt : they come advising, consoling, supporting. So is the power of death revealed ; so, truly, is the spirit of the dead set free—the never-dying spirit which adds to the life of the world. So we read the Roll of Honour—names familiar to us, their names engraved in the life of the school. Many will have their names written deep in this life ; nay, all, for no man can measure the silent, powerful influence of the loving spirit, nor know the sweetness of life, of encouragement, of sympathy which proceeded out of it. Many are remembered for the special work they did in their school-days—boys delightful, kindly, irrepressibly cheerful and hopeful, spreading the rays of kindliness throughout the house and the school. Dear, good souls, we remember them well. Then there is the boy of great strength of character, strong, frank, capable of hardness, capable, masterful, loved by the young boys of his house. As I look back through the list I see such boys of solid worth ; good lieutenants they were, helpful, not afraid of a difficulty—boys who took up some special work which called to be done, not for their own education or for ease, but that they might take their share in the work of the life of the school. Boys, too, who voiced the wishes and feelings and needs of their fellows, and suggested and carried out reforms ; earnest of purpose, visionary too, it may be, effective workers, creative ; boys who in games, in work, in loveliness of life, have kept in their sight the dignity of their house and school. A noble army, whose faces shine before us ; a cloud of witnesses like the angel faces which we can see in the mystic clouds of some great picture. Gone, but yet their spirits abide : the trail of their souls remains. Often, indeed, can we trace the stream of their

individual life long after they have left school, still manifest in the school.

'But for the years to come, when the war is over, it will be well to have some visible memorial; some symbol of the redemption of the Great War, and of the heroic part old boys have taken in it; some record of the great struggle from out of which the new spirit will rise; some record of the part the whole school took in this; some record of the boys who have fallen; some thanksgiving symbol for all who have given their service. And for this it is proposed to build a chapel. But when the time comes we shall be sad to leave this present building. It is a poor building, but it is very rich in its associations. The services here in this temporary chapel have taken a large part in the building of the school. Simple as the Tent in the Wilderness, yet we have hoped that the Spirit of God would come and dwell in it. We have hoped that the Divine Spirit would come into all the activities and outlook of the school in its diverse occupations, whether they be literary or whether they be scientific or technical. And we have always looked onwards to the day when a permanent chapel should be built, symbolic of the Divine Omnipresence, for worship and for sacrifice.

'And this is what is in mind to do—and yet I confess to a certain amount of fear. A lofty, spacious chapel I have had no doubt would at the right moment be built by the Grocers' Company. Just before the war the building of this chapel was emerging as the next great building to undertake—a chapel, such as a college chapel with stalls, as for private service. But now we look beyond this. We want something different, more open. A lofty, spacious chapel to form the nave—no fixed seats, the clear open space: quiet, still, "urgent with beauty." Joined to this the choir and sanctuary, with aisles round the three sides

of it, forming an ambulatory. Round these aisles, on the walls and in the windows, the recorded memory of the boys who have fallen. An east window, a reredos, stalls, altar. A chapel, abundant in space, not for the mind to sit down in, but for the mind to move about in, for contemplation, for dwelling in the infinite, for piercing through the night, for vision, for the clear spirit of thankfulness, for communion with the saints, our own young saints among them. So we hope. As you wander round the aisles there will pass before you the memorial of those boys who have cast down their lives for the rescue of man.'

Scribbled in pencil after this sermon we find these quotations. They show the man deeply wounded by the deaths of those he loved, seeking comfort after his fashion.

'If a grain of wheat fall into the earth, it abideth by itself alone; but if it die, it beareth much fruit.'

'I came that ye might have life, and that ye might have it more abundantly.'

'They do not die,
Nor lose their mortal sympathy,
Nor change to us, although they change.'

'Death's truer name
Is "Onward," no discordance in the roll
And march of that Eternal Harmony
Whereto the worlds beat time.'

## § 12. The Work before us

'And God saw that it was good, and there was evening, and there was morning, and the day's work was done: and God saw that it was good.'

'Day by day, step by step, stage by stage, in the order of creation, in the evolving or making of things, in the preparing and coming of things, a day's work is before us, and

a day's work is done. The day comes to each of us, before us is what we have to do towards fulfilling our part in the great creation which is proceeding. To us is given day by day, more clearly than before, what we have to do—and what a mighty influence for good in life if we can say, "There was evening and there was morning and the day's work is done, and behold, God saw that it was good." Such a vision and purpose of life comes when we are always creating, making, developing, discovering: always have in front of us something to attain to, some new venture, something on before.

'Life will become ineffective and dull and deathly if we are content day by day to do the same thing, and content to mark no progress, if we have nothing of vision—have no "step" in the uplifting which should, might be, may be taken to-day. Much of our daily work tends to become routine, and effortless, and in a seductive sense comfortable, easy, pleasant—but this is not the purpose of the life given to us, nor does it carry us into the high activities of creative life. You will remember the fundamental principle of all things that live is the persistent experience of dynamic resistance and the persistent restless urge to create. "I came not to send peace, but a sword." The active spring and joy of life is not to live in the smoothness of tranquillity but in the joy of a dangerous life. The secret of a joyful life is to live dangerously.

'The fundamental instinct of life is to create, to make, to discover, to grow, to progress. Every one in some form or another has experience of this joy of creating; the joy of seeing the growth, the building, the change, the coming. The instinct of those in authority has recognised—without perhaps knowing it—the love to create, when they devised punishment—the treadmill, prisons, routine, all thwarting that free creative impulse to the point of torture. Or on a

minor scale the trivial school stupidities and idlenesses of "lines"; detentions without labour or sacrifice or both; or even the cheap and easy physical punishment. Such punishment, if not all inflicted punishment, springs out of the distinctive protective aim of slavery. Creative life comes slowly.

'Life, this beautiful, creative life, comes slowly through the ages, but it comes. Slowly mankind is emerging out of slavery into the beautiful freedom of creative life. Slowly mankind is realising the natural desire, the instinctive natural urge, the essential need for life—of each individual to be free. Free—*i.e.* free to strive, to endeavour, to reach onwards, to create, to make, to beget. The economic freedom of the individual has been slowly escaping throughout history. It burst into a new vigorous life through the hammering blows of the French Revolution. During the last century or more this principle of freedom has been changing our political relationships and values. This economic escape may be said to have reacted on science, and the modern developments of evolution have benefited by the spreading change in the temper of mind, and by the influx of workers and creative thinkers from the enslaved order.

'And this raises a large question which I have in mind this morning. Every one can see to-day the immensity of the problems before the world. It does not need much reflection, or foresight, or knowledge, to see that the organisation of the intercourse of races is hurrying on to becoming a dangerous problem. As has been said, and as any one I think with powers of sight can see, it is in a large sense a race between education and catastrophe. And the question we in schools have to ask is, Can we in schools be outside all this? Can we confine our work, our play, our necessary work, our necessary play, to the recognised,

traditional work or play of schools? We here think not. We believe that schools should move on towards becoming always a microcosm of the new world. A microcosm, and experiment, of the standards of value, of the commandments, the statutes and judgments, of the organisation, of the visions and aims of a coming world. We must not get into our heads that these are theoretical things, it may be, pure idealistic sort of things, or, it may be, new and dangerous things. They are none of these things—they can be expressed in very everyday, homely, matter-of-fact things and in the doing of our ordinary work. Of course they do mean thought, a tendency to believe, a faith in boys—and they do mean labour, and sacrifice—*i.e.* as they are called or thought of at first—until both pass on into the beautiful life.

'Such aims and urges become terrific powers for prolonging the life of man; and as the stream of life goes on it becomes more and more like a vast river moving slowly forward with greater power, receiving more and more of tributaries, slowly, strongly, surely flowing on "unto the estuary that enlarges, and spreads itself grandly as it pours its waters into the great ocean of sea."

'But the beginnings are here: and here boys must find themselves in the great stream of true life. They must find themselves in the lands of the great vision, of faith, of service. No beating or marking of time here. No easy static state. No satisfaction with conventional static comfort. Here they will join in this great world-life. They came from their homes to join the great world-life here. Even these tiny boys here will feel that something is before them that matters, something of true life and true intent. They will get the germs of life from some of those things we are perpetually trying to do, and never succeeding in doing. They will catch the contagion of effort. For learning is

not our object here, but doing. They may learn things in a deadly static way, they may learn much in a static way and gain nothing of life. Not here I hope. No, the germs of life come from the spirit; from the incessant travail of the soul; from high intent; they come from the burning desire to know of the things that are coming into the world. . . .'

## CHAPTER THE SIXTH

### THE RIPENED OUNDLE IDEA

FOLLOWING upon these sermons, we give here a series of papers and addresses which were delivered to various conferences and gatherings between the end of 1916 and his death. In the last years of his life he became more and more a propagandist. These addresses present him, firm and assured, shaping out his idea of the modern school as the basis of a renascent civilisation. We have edited these papers hardly at all. Some repetitions we have cut; for instance he turned time after time to the diary of Faraday already quoted in his sermon under Faraday's name in the previous chapter. Faraday, for him, was one of the great Saints, if not the greatest Saint, of science. For all practical purposes Faraday has replaced St. Antony as the patron Saint of Oundle, and the laboratory, whether literary or scientific, the cell as the scene of a true Oundelian's service for God and man.

These addresses tell their own story, and there will be no need for the Editor to flit about, like the referee at a prize fight, intervening between the great teacher and his readers. But we may note here that at the end of the chapter is a very interesting paper by another hand. Shortly before his death Sanderson instructed one of the leading Sixth Form boys to make a précis of his leading ideas, 'Some Obiter Dicta.' He was always doubtful of his powers of expression, and he probably wanted to see how much he

was getting over to his hearers and readers. This précis was intended originally for the 1922 Commemoration pamphlet. He read it and approved of it, and it was found on his desk after his death. It serves a very useful purpose of recapitulation here.

### 1. A Modern Education [1]

In the reconstruction of Education which is now being attempted the advocates of Science are claiming for science a more effective place in the schools than it holds to-day. But they are baffled in their advocacy by an uneasy feeling that science teaching has not hitherto shown itself alive. It is useless to cry for science until the science teaching stirs itself into life; better let things remain as they are than bring in a 'dead' science.

The fact is, that although science has come into the schools, the scientific spirit, outlook, and methods have not touched the fringe of the school life. One serious cause of this is, that science masters have too little opportunities of becoming headmasters of great schools and so exerting their influence to the fullest extent. This restricts the outlook, and most science masters have in consequence too modest a belief in science. They are content to join the staff of a school as specialists to teach a mechanic art. But science is not mechanic; science is creative, vital, fundamental, self-sufficient in everything that touches the welfare of the people and the development of the race. It must not, and will not, come into a school to teach a mechanic art; it comes to transform men's ideals, to change the values of the things of life, to influence the whole education of the school. A high claim is made, but no lower claim will bring

[1] Contributed to a book, *Natural Science and the Classical System in Education*, compiled by Sir E. Ray Lankester.

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science into schools. No weaker belief will make science a true effective force.

The teachers of science do not take up their full responsibility in schools : they are too readily overwhelmed by the traditional authority which their classical colleagues maintain. The classical master has always had the charge of a form of boys, and he has made his influence felt in every part of their school life. He teaches classics, but he teaches much more than classics ; from him the boys get their inspiration and ideals. But in most schools the science master does not exert his influence in this way. He is called in as a specialist, to do a special work, and he keeps to this. This is where science remains weak and ineffective. Boys want to feel that their work in school is important, and that the ideals created thereby go with them into their everyday life, and permeate all they do. The science master must make bold his claim, and be true to his mission. He must lay his claim large and wide, for the claims of science are great. All the astonishing wealth of the science we have to-day shows the working in the life of man of a new force, urging men to high exploits, to fresh faculties, to a change of aims, and to a reversal of belief. If any part of this life of science is to come to schools it must come with its full creative power in a large way. The science master must be true to his mission. He must hold himself bound to be the messenger of a new ideal of life, and he may expect difficulties and opposition.

The entry of science into schools is not the simple thing it may appear ; its coming means change which is not simple but anarchic. And for this it comes slowly, with halting pace, for it calls for more than a place in the curriculum, the admission to some examination, the organising of an engineering side, or the building of new laboratories and workshops. These must be, but they are the dry bones

of the thing. The most exclusive of conservative schoolmasters do not fear them. What men fear is a change of values.

But science is ever invoking a change of values. Its spirit is the spirit of growth, of change, of death and life. Its motto is always the words of the Master : ' I came that ye might have life, and that ye might have it more abundantly.' This is the direct teaching of the new science of Biology: it must be the watchword of all teachers of science. It is an answer to the question : What is life for ? Science means changing, moving onwards, creating. Its outlook is onwards. And so we get a guiding principle of science teaching. Science in schools must lead to research, discovery, and to the application of knowledge for the needs of man—not dwelling entirely on the past, but absorbing the past in the present, and moving onwards.

The teacher of science must start with the things known and go onwards with the work which is waiting to be done. And there is a bountiful field of work to be done in which schools may take their share. This creativeness is the genius of science, its gift to men. The student of science must be ever doing, making, searching, creating. Science has little to do with dominance, or with the evolution of a dominant type. Here is where a differentiation sets in, for the public schools claim to educate for leadership—leaders of men. What they teach and how it is taught springs out of this ideal. It is the ideal of the class-room. But the direct object of science teaching is to send out a stream of inspired workers, inquirers, searchers, and the characteristics of dominance are not its concern. Whatever of dominance it may give is the dominance of service. Whether we like it or not, these considerations are the root of the matter. To have life in itself science must be true to its own genius.

The science master must also be true to this spirit. He must not be misled by the many fetishes with which it is sought to adorn educational theories. Such fetishes are often the prelude to deathly reaction. They appear in many guises—character, culture, 'educating to think.' All these may lead the schoolmaster away from his one purpose. The main purpose of education, as we conceive it, is none of these things ; its purpose is to get more of life, of creativeness. If this be sought all things else will be added unto it. And this spirit of science the science master will bring into all parts of the school life. Literature, Art, History will be regenerated by this spirit. They form a wide field open for the teacher of science and his pupil to explore. Here he must claim his own—and be true to the genius of science.

It is to be feared that this high function of science is not maintained by the present race of science masters. They keep close to their special work, with an intensive devotion which is a source of life to the school as yet not drawn upon ; but they must aspire to a wider influence. Here are the words of a science master of a celebrated public school. He says, 'The best work in a school laboratory is always done by boys who have reached a reasonable standard in other subjects. What is wanted is a sound general education, and less science.' The statement itself has an air of indefiniteness about it, but we need not discuss it. It is an old question which might be buried. We read about it voluminously in the old days of the 'Little-go Greek' controversy. The important question for us to ask is, what is meant by science, for what the science master above quoted means by science is not the science we are advocating for admission to the schools. It is probably a training in manipulative skill in the laboratory by the repetition of the well-known 'elements' of science, and by carefully and

logically organised courses of physical measurements. What he has in mind is a ' dead ' science—for science grows old and gives up its life to be born again. Many of the most vital of scientific discoveries have delivered their souls to others. The ' science master ' had in mind the meticulous performance of ' elementary ' experiments, dearly venerated in the schools.

Science teaching too often begins (where we hope the teaching of languages has made a finish) in a drilling by means of the elements, the grammar of science. What the ' science master ' whom we have cited has not in mind, is what with repeated emphasis we call the ' creative life of science.' We claim that living creative science has more to give to literature, art, and history in these days than science has to gain from literary studies. The work of the schools is to study history, economics, philosophy, art, literature, under the dominant power of the new values created by scientific research and discovery. Here is work and faith for the teacher of science. He has to inspire the onward march of science, the reversal, change, growth of science. He can bring new ideals and aims, and new methods into education. His methods are not limited to natural science. He can bring these into other workshops and laboratories, he can bring them into the literary workshops, the library, art-room, museum, theatre. He can apply them to the social and economic questions, and let the school take its part in ' escape.' In times to come the schoolmaster will not be a teacher only, he will be a worker in some kind of knowledge, and will lead his boys with him. The schoolmaster's profession will find its own escape, and will not rush itself into a blind alley.

Again we say that science teaching must be alive, changing, moving forward. It should not have about it the atmosphere of certainty and finality. This kind of atmo-

sphere is formed, however, by the traditional adherence to experiments on the verification of laws and the study of the elements. The Laws of Science, Boyle's Law, Archimedes' Law, Faraday's Laws, Ohm's Law, Newton's Laws of Motion, the parallelogram and triangle of forces, the mention of which opens out a long vista of traditional experiments of our youth (all, it may be noted, quite detached from any knowledge of the great discoverers themselves)—all these should be dropped. Far better make full use of them in Applied Science. It is a safe rule at present to avoid making apparatus for teaching purposes. There is a plentiful supply of things in the world wherewith to sharpen the faculties. The special teaching apparatus has always seemed to me to be the unnatural part of the Froebel and Montessori systems.

How well I remember, years ago, setting out to teach science with an army of cylinders, brass, iron, and deceptive wood, forty boys working in pairs, all doing the same experiment at the same time, squared paper at sixpence per sheet, metric scales to order ! Then the instrument-makers came and fought with each other in turning out the cheapest 'Archimedes set,' or in inventing the most expensively elaborate set for rich people ; then the schoolmaster came and improved on these, and invented new kinds of Boyle's Law apparatus and patented them, or sent them to the *School World*. Perhaps these things were right thirty years ago. In those days boys never used instruments or measured anything ; they learned elementary arithmetic (there was a great reform when the examiners set questions involving the metric units !), algebra, geometry, and when they got into the top set a little trigonometry and mechanics. In those days the dynamo was struggling with the engine to steady electric light. It is true that cotton- and silk-covered wire could be bought, but, if I

remember right, the ammeter and voltmeter had not come, nor the storage battery, and the potentiometer was in the background waiting until more favoured instruments were tried. The march of science has spread itself out since then —so must the teaching of science. The potentiometer won in the long run, and the familiar cylinders, Boyle's Law apparatus, and all their kind must pass away.

I regret that I cannot even agree with those progressive schoolmasters who are content to break the fall by changing from the small cylinders and cheap balances to a barge in a bath. Much better make the plunge and try no more to ' verify ' or ' discover ' (faint deception) these well-known facts. Rather, read Archimedes. Read the researches of the Heroes of Science. Read Faraday's papers. Take his papers on Electrolysis, and mark the long procession of experiments, the number and wonder of the stuffs, the diversity of method, the trials and failures, uncertainties, doubts, and suggestiveness, the atmosphere of discovery. Read his electromagnetic researches, and watch the belief, the patience, openness of mind, inventiveness.

I appeal, therefore, for an escape from the bondage of elementary science and physical measurements; those records have done their work for the present, and a wider sphere awaits us. There must be a return to the Romance of Science; a vigorous effort should be made to work at Applied Science in all parts of the school from the preparatory school upwards; and every school should have a well-equipped workshop.

The Romance of Science can be kept before boys by means of experiments and exhibits which the boys themselves arrange. Mechanics, Physics, Chemistry, Biology provide a host of such exhibits and experiments. Junior boys may set up a series of historic experiments; senior boys may illustrate modern advances. There are many

books amongst the classics in science which will form a nucleus for such an exhibition. A few very well-known ones need only be mentioned : Tyndall's *Heat and Sound* ; Faraday's *Researches* ; Ball's *Mechanics* ; Perry's *Steam-Engine* ; Thompson's *Light, Visible and Invisible* ; Wright's *Projection of Light* ; Boys' *Soap Bubbles,* and Perry's *Spinning Tops* ; Lodge's *Pioneers of Science.* There are experiments on discharges through rarefied gases, radium and X-rays, vibrating springs, liquid air, rotating bodies. Many chemical experiments and biological exhibits are possible. Lectures or exhibits can be prepared to illustrate the life and works of the great investigators—men like Faraday, Dalton, Darwin, Pasteur. Original papers can in this way be brought before the school. If the school possess plenty of space, many exhibits can be left on view for a term or more.

A valuable addition to a school, or combination of schools, is a Museum of History, where the development in Art and Science may be illustrated. In the Museum there should be a gallery of the world's workers and pioneers, that something may be learned of their lives, and what they looked like. Here may be shown such things as the genealogical tree of the aeroplane, the uprising of Biology, the rescue of slaves, the influence of science in the social life, and so on.

Applied Science will demand a large instalment of plant, and spacious places. The class-room will be used chiefly as a tool-sharpening room—necessary but subsidiary. Schools will want spacious workshops, engine-room, and power-station ; laboratories ; engineering laboratory ; physical, chemical, and biological laboratories ; museum ; gardens ; fields. This seems a heavy demand, but most of the public schools have already many of these, and the others with the requisite plant can be added. The Secondary Schools must expand in the same way. Nothing

appears so prison-like and stagnant as the usual stack of class-rooms. What is wanted for the larger work are workshops, and workshops, moreover, of a new kind—literary, technical, and scientific workshops, with fewer class-rooms.

The teaching of Applied Science will be found to simplify many of the science problems. The science elements are included in such work, and abundance of practice is given in exact measurements. The study of the steam-engine and of internal-combustion engines is a good example. An experimental study of these in the laboratory and drawing office, inspired by such a living book as Perry's *Steam-Engine*, is educational, informative, and suggestive of possibilities yet to reach. So through the range of Applied Mechanics and Physics—and in the wide fields of Chemistry and Biology—there is inspiriting scope.

Applied Biology and Applied Chemistry are full of problems awaiting the worker—well within the power of a school.

Biology, the most recent comer, should be an integral part of school studies, and take its place by the side of Languages and Mathematics. In the early years it should be taught to all, and later a group of earnest specialists will arise. The importance of Biology in a scheme of general education cannot be overstated. It can safely be affirmed that no study of social life can be undertaken without a working knowledge of the results and methods of this science of life. The reading of history, of literature, and what are misleadingly called ' humanistic ' studies must be done again under the influence of Biology. A spacious laboratory, gardens, fields, experimental farm, museum, will, in years near at hand, be an essential part of every good school. A miniature Kew, Natural History Museum, Zoological Gardens, Rothamsted Bio-Chemical Laboratory,

might all quite well be placed within reach of the schoolboy —for research, for history, for work, for delight, and inspiration.

Romance of Science, Applied Science, and what is called in pedagogic professional language ' Manual Instruction,' but what I will call simply ' Workshops,' are the three aspects of the scientific work in school which open out fields of knowledge. The bureaucratic ' Manual Instruction ' brings to my recollection the kind of thing which used to masquerade in the schools. As I remember these courses of Instruction they were elaborately arranged exercises following in some ' logical ' order, in which the youth found himself learning to use a saw, a tenon saw, a rip saw, a jack plane, a smoothing plane, a gouge—and all for no purpose. Drawings he had to make, showing full dimensions of length and breadth and thickness—in hosts of cases where these were entirely unnecessary ; but this work I suppose could be ' co-ordinated ' (blessed word !) with the rest of his work in school. The manual instructor—what kind of man was he ? He was not a skilled mechanic, who could do the job and had at his finger-tips all sorts of ingenious devices unknown to the mathematician. Such a man could not ' earn grant.' No ! he was an elementary schoolmaster, who had taken one sessional course at an evening school—he was at least qualified to earn grant. But these things may all have changed now, and I may be beating the air. Judging, however, by the position ' manual instruction ' is still condemned to take in the schools, I have a suspicion that this kind of thing dies hard.

This is the line of thought which prevails in the bureaucratic government : Manual instruction does not produce much inspiration—put it amongst the extras ; mechanics, as usually done, is largely mathematical—abandon it and let it take its old place in mathematics.

Does not the fact that Applied Mechanics has come upon us in the last fifty years, and touches all parts of the nation's life, seem to suggest that mechanics should be reformed and given a higher place than ever, and that live workshops should replace 'Manual Instruction'? Whenever the working classes themselves have had snatches of opportunities to arrange for their own education, they have gone off to applied science and the workshops. And they are right. Is the cry of organised Labour of no account?

It is, we hold, seriously necessary that effective workshops should be established—not for public schools only, but for secondary and elementary schools. They must be on a large manufacturing commercial scale—comprising engine-room, engineering shops fitted with a complement of machine tools to work a large number of boys, carpenter's or pattern-making shop, forge, and foundry. These shops can be made self-supporting. Good craftsmen would be turned out as leaders or workers in the industrial life of the country. A craftsman's knowledge is of value to all sorts of professional men, and its importance will grow. And training in schools has many advantages over training in the works—where matters are distorted by the inevitable conflict between Capital and Labour. The anxiety of the employer to train his apprentices has come too late.

The school workshop is the home of 'creativeness.' Here the boys do not come to learn anything. Here there is no instructor, but fellow-workmen. The boys come not to learn but to do, to make; and their attention is fixed on the work. This spirit, the determination to do the work, and to acquire skill to do more, will go with them into other parts of the school. So we believe. Such a workshop, arranged for output, with automatic, semi-automatic, non-automatic machines, plenty of repetition work, will give

the means for studying the difficulties and dangers of modern industrial life. Boys will go out with a knowledge of this, and changes—highly necessary changes—will follow in the works : changes of work ; higher work ; use made of ability ; development of the capacities of the workers ; transference to office, and so ' leisure ' as it is called.

We contend that education in science on these principles should take a prominent part in the schools, and that what is called ' general education ' will take care of itself. I am not quite certain what is meant by ' a general education,' nor am I at all anxious that science or any subject should be made compulsory even for a leaving certificate at the age of seventeen. But as various syllabuses of the kind are now being formed, it is well that the believers in a scientific education should realise that none of these examinations insists upon science. The idea of a general education sprang into existence when science became turbulent. The educational policy of the headmasters says ' more stress ought to be laid upon general education as a preliminary to a technical training.' This, I believe, is the wrong way about. But even so, the general education does not necessarily include science—but it does of necessity include a language, and English subjects. This is worthy of consideration in view of the concordats which are being reached. The first examination of the kind has just taken place for the School Certificate of the Oxford and Cambridge Board. This examination was taken by a large number of the leading public schools. There were 825 candidates, but not more than 50 or 60 were examined in science ! Yet the certificate is a certificate for the much-discussed ' general education.' The executive have made science and mathematics alternative, and 772 took elementary mathematics, 194 advanced mathematics.

To make mathematics and science alternative will encourage neither the schools nor the education committees to undertake seriously the proper teaching of science. Science properly done demands an expenditure in capital and maintenance, which, as things are at present, is outside the field of view of either the schools or the committees—not that money cannot be got, but the will is weak. Elements of science which are now being taught are quite ineffective, so that we can well imagine how a headmaster who means business will set to work to make mathematics his chief concern. This is disastrous to education, but without heavy grants it is the best that can be done. The truth is, that mathematics, without its applications in science, is not a ' creative ' stimulus for the school—except, it may be, for a very few specialists. The woeful neglect of science by the authorities concerned is the saddest state of things for the creative life of the nation. But it would appear that with all the concordats this neglect is to continue.

I have been asked by the editor to write on the Good and Bad Methods in Science Teaching. I have some qualifications to speak on the latter. In the course of time I have escaped from a method which I now hold is altogether bad, and I have all the conviction of a convert. I hope the escape is complete, but it is hard to be certain because the counter-attractions are alluring. However, I have little to say for—and much to say against—the slavish adherence to logic and logical form. I know quite well its attractions, and for a small number of special boys it may be the very life, but for the rest of the school I feel sure it is dull and of much less value than its advocates think. I need not dwell on the snares of formal logic, its insecure premises, or the doubtful uses to which it can be put. I believe we want to get away from formal ' training to think.' Boys come to

school to do something, and not to learn. Learning will come as a by-product. A gorgeous illustration of the logical ' order ' system—the ' teaching to think '—is seen in the joint report of a Committee of the Mathematical Association and the Public Schools Science Masters' Association. It is dated 1908, but I see it is confirmed in the Report of the British Association on Science Teaching just issued, and it has recently been reissued. The Committee's Report is a working concordat solemnly made between the Mathematical Masters and the Science Masters of the Public Schools. They agreed that mathematics and simple practical measurements should be carefully divided between the respective staffs. After evidence had been obtained from the schools, it was agreed between them that any practical measurement requiring a balance, but not water, should be done by the mathematical master in his own class-room, but if water were required the measurements should then pass on to the science master! I think this was finally agreed upon, but I am not quite certain. It is a quarrel between Euclid and Archimedes. Euclid, as far as I know, did not use water for any proof: Archimedes, of course, did. The Report should be read; it is a lengthy and complete report. I hope I am not doing it an injustice. I can understand the frame of mind, but I cannot now have any sympathy with it. There is some doubt in the Report as to what is the stage at which a boy should use logarithms, but the reporters are unanimously against the tables of anti-logarithms or co-logarithms. The slide rule can be given to boys after they have learnt logarithms. There is no doubt when the value of $\pi$ should be experimentally determined, and no less that six methods, of which the boys should do at least two, are given in a special appendix. But I will say no more. I cannot see the point of all this, but I think it reveals a curious difficulty which masters

have to meet when they set forth to get a live thing like science into the schools. The science masters do the best they can.

Mathematics very slowly escapes from this meticulous bondage. I read that ' mathematics is built up of a series of logical steps, each step in itself being simple and independent of authority. This study accordingly enables the teacher to call upon the pupil for a series of efforts adapted to his ability ; in each case there is a reasonable prospect that a pupil will be rewarded with success ; his success or failure can be made plain to him as a matter beyond dispute, and independent of the authority and taste of any second person. The features which are peculiar to mathematics are the essence of its functions as mental gymnastics.' I am sorry I cannot live on this plane in schools—perhaps if I were teaching the very highest mathematics in the school I might, but for the average boy of the school it is too difficult. It seems to limit the range of mathematics, and restrict its application. I do not imagine the distinguished schoolmasters follow this too severely. They let themselves go, and the boys get to know more about things, and more of mathematics, than they should, and before it is intended. For the sake of weaker brethren I should like to see any syllabus based on these principles undergo a drastic extension. So it seems desirable to me. My own plan is, to have mathematics taught from the beginning on the parallel system, and to a large extent by means of its application. Applied Science comes to the mathematician's aid. Very young boys of the preparatory school age can make the investigations. They can perform tests with steam- and gas-engines, finding horse-power, efficiency, consumption of fuel, b.h.p., i.h.p.; work out cards; experiment with voltmeters and ammeters; use a testing-machine. Calculations required in experi-

ments of this kind can be extended into the mathematical class-rooms. Tools, too, may be sharpened up here. Data can be supplied to be worked out in the class-rooms. The master can talk round the problem, and if many calculations are required the work can be divided up amongst the boys. The final results can be set forth, not as an answer but in the form of a written report.

This form of teaching extends the range of mathematics which may be covered in the early years, and boys of fourteen or fifteen may be introduced to the study of the Calculus and Co-ordinate Geometry. A good example is seen in the work done by young boys in Osborne and Dartmouth, where the range of mathematics is much extended. This, no doubt, was originally done for professional purposes, but is now found best educationally.

The research method may be pursued in History, English, Geography, Languages. Experiments on this method are being made in several schools. I should like to see what may be called literary workshops of spacious size, and fewer class-rooms. A school could be built on the plan of a museum, with working-rooms for the assistants: a spacious library, with books, maps, charts, diagrams; art-room with pictures, photographs, maps, charts; a large wing for French; another for other languages. Here several forms would be found working in a general mix-up in all parts of the building—masters researching, boys helping. Take a public school form of twenty-five boys: five groups of five, voluntarily formed. One group is investigating the liberation of slaves: Travels in Africa, Crossing the Atlantic, Life in Kentucky, Virginia, Abraham Lincoln, Wilberforce, Bright. Another group: The coming of the loom and of industrial life in England; another, the liberation of Italy; another, Wars. A great and happy time is the result, and the boundary between school and

play becomes more hazy than usual. Yet this is a scheme not altogether Utopian.

### 2. Work in Preparatory Schools[1]

I shall not be wrong in assuming that my presence here is due to the interest you are taking in the teaching of Science and Mathematics in your schools. Therefore I shall largely confine myself to the teaching of Mathematics and Natural Science in Preparatory Schools. I have had a certain amount of experience in the teaching of young boys. We have a Junior School at Oundle with boys from the age of nine up to that of fourteen; and if any of the methods I propose in this Address seem perhaps extreme, at any rate, gentlemen, they have been tried. It will not be necessary for me, I am glad to say, to join in any advocacy of Science against Classics in the curriculum either of Public Schools or of Preparatory Schools. After long years of dispute it is satisfactory to find that a considerable amount of agreement has been reached amongst teachers and others interested in education. Schoolmasters in Public Schools are growing more into sympathy one with another; they know one another better than in earlier days, and are willing to recognise that the same ideals may be pursued along apparently widely different paths. But whilst this conflict between Science and Classics is disappearing, there is to my mind a graver question looming above the horizon, one which will require more debate than even the relative merits of Classics and Science. The question to be considered will not be the relative merits of Classics and Science; men are, unconsciously perhaps, inquiring into the nature of the ideals themselves, and not so much into the means of attaining to them.

[1] An Address delivered at the Annual Conference of the Association of Preparatory Schools, 21st December 1916.

The coming question may be put in this way. Shall the object of education in schools be one for leadership, that is, for dominance, or shall it be for service ? Further, must all schools of every kind—from the Preparatory Schools, which you represent, down to the Elementary Schools, where boys of the same ages as yours have been educated, must all these have for their point of view the same ideal in education ? This, gentlemen, I think, will come to be the most vital question.

The problem presents itself in three forms.

In the first place the members of your Association are concerned with the education of boys destined to become leaders of men, whilst the Elementary Schools are more concerned with the education of boys whose aim in life is 'service.' In the discussion on education, the question is whether the kind of education given in the schools like yours and, further, in the Public Schools, shall be of the same kind as the education which should be given in Elementary Schools and in the Higher Grade Schools proceeding out of the Elementary ?

This is a grave question, because at the present moment the kind of education which is given in the Public Schools and in the Preparatory Schools is imposed on the Elementary Schools. That is to say, the education for dominance is imposed on children whose outlook in life is quite different. We wonder whether this is right, and whether it should continue or not. And the asking of this question raises a large issue in all problems of educational reconstruction. What should be the aim in life lies at the root of educational method. Shall this ideal be the same for all ? If not, what effect must the difference of outlook have on the education in each type of school ?

There is another question that perhaps more directly concerns the type of school in which you are interested.

Will the methods which have been supreme in the past remain adequate for your own purpose in the changing circumstances of industrial life, with the rising of new forces, and with shifting values of things ? Will they suffice to train men to become effective leaders of the more educated and more critical and powerful workers ? Will it not be necessary for the masters and leaders to attain to a higher standard of technical knowledge and to a closer sympathy with modern industrial life ?

And there is a third and perhaps even more important question to take into account. Is the education for dominance and possession destined to survive ? Should not service be the ideal for all schools—creativeness and not possession ? If so, then account must be taken of this ideal in educational reform.

I offer these questions to you, because they seem to be at the root of the differences of view in all educational theories. I leave them with you. We may not agree, but it is as well to see from whence differences arise. I have referred to them, because I feel they are closely connected with the Methods of Education and with any reconstruction of educational systems.

My object, however, this afternoon is not this ; nor is it my purpose to advocate the teaching of Science, but rather to discuss some of the aims of Science, and to suggest methods which may be adopted.

So far as my own experience goes—and I have been as a schoolmaster some thirty years closely associated with Science teaching—the bedrock of general Science teaching is to be found in the workshops—a workshop where boys go to make things and develop into good craftsmen, become handy with tools and machines, capable of making their tools and repairing them ; where the object is to do and not to learn, and where we hope that

faculties of initiative and inventiveness are aroused and exercised.

To do this well—and if not done well, no fair trial of the system is given—there should be both a carpenter's shop and a metal shop, well supplied with tools. These shops can be run on two plans. There is the individualistic plan, where boys make things for themselves and follow their hobby—a very excellent way, and not to be entirely given up ; and there is the method of working the shops on the manufacturing or co-operative line. The war has shown what can be done by the co-operative method. In the carpenter's shop a class of boys can be put to one job, such as the turning out of screens, or crutches, or splints ; whilst in the metal shop they can turn out a variety of parts required for munitions. Even in Preparatory Schools boys can take part in the great need of the time—in munition-making. Quite young boys, even boys of nine, can be put to the more easy work in the metal shops, filing, drilling, and roughing out on the lathe.

The co-operative method is very useful ; the value of each boy's work can be felt, and those who are weak in other parts of the school may show their strength here, and thus take a higher place amongst their fellows, and gain in self-respect and self-reliance. Untold good to individual boys comes in this way, especially when a difficult or urgent job comes along and the best boy is required.

Incidentally, also, the boys are starting preparation for their future work in life, which need not necessarily be engineering. There are all kinds of professions where, in these days, a knowledge of technical subjects is essential—barristers, solicitors, agriculturists, country gentlemen, and any whose duty in life is ' to do.' Certainly there is a great call for workers in many fields of research—in Medicine, Agriculture, Economics, Social Questions ; and in most of

these technical knowledge is needed. Leaders are wanted who can direct the workers, and raise the average worker to higher aims. This war has emphasised the crying need for boys trained in our schools to take up the better and higher kinds of scientific work.

From the workshops we come to Science itself. What shall be taught to young boys in Preparatory Schools from the age of nine upwards ? The same question was asked some fifty years ago with reference to the Public Schools. What Science should be introduced into these schools ? The pioneers were Huxley and Tyndall. Under their influence the method of teaching Science by demonstration lectures was introduced into the schools. The purpose of this was to interest the boys in the astonishing discoveries that were being made and to inspire boys with a love of Science. Many a boy must have found a new world in those days. But, as some of you know, the results were for two reasons not on the whole successful.

In the first place, Science masters were not easily found, and, when found, they were not all Huxleys and Tyndalls. In the second place, and probably this was the real reason, boys do not like to look at things with which they themselves have had nothing to do. Boys like to do things, and not to watch other people doing them. They want a share in the doing, and it is by doing that they can see.

Some twenty years later a change was made. The boys were taken away from the lecture-halls and brought into the laboratories to do things themselves—to make experiments. One of the first schoolmasters to introduce this kind of practical work into Public Schools was the late Professor Worthington, who was a master of the craft, both in the laboratory and in the lecture-room. To do something, to investigate, to experiment — the science of ' Physical Measurements.' This Science course seems now

to be well established in schools; perhaps a trifle too firmly and exclusively. But it will remain as grammar must remain, though in unskilful hands it may be dull. A bonfire of books and apparatus is useful now and again.

I need not dwell on the work included in Physical Measurements. There are many text-books; the course is well defined, and has recently been rejuvenated by Mr. Siddons of Harrow. It must always find a place in schools.

It is more important at the present day to revive the demonstration methods which Huxley and Tyndall had in view. The Romance of Science we may call it; and it is romance which brings inspiration. It is the first duty of the Science master to inspire boys with the love of Science, to let them feel the mysteries of Science, and the mysticism of it. It is a good thing to bring even young boys up to the unknown where research is still going on, to let them see something of adventure in the natural world, to excite their wonder. There are, of course, quite a host of experiments which young boys can repeat and, as it were, play with; experiments which will keep their eyes open and give plenty of inspiration. The Romance of Science opens out ideals, the wondrous experiments stir up faith and belief; Physical Measurements train boys to do exact work, and in doing this exact work the mind is better fitted to see and to recognise the significance of things. Both aims are necessary—to believe and to do; one reacts upon the other, nor can one be effective without the other. But, so far as I know, it is Romance that wants emphasising in schools at the present time. Only to a limited extent is this done by what is given the unfortunate name of 'Nature Study'; for in many ways Nature has gone the way of Physical Measurement. The romance has been driven out of it by over-instruction, by too many syllabuses, and by methods

which have become too stereotyped and too much organised.

It must rest with the individual master, in his own way and with his own subject, to stimulate the interest and to keep scientific studies alive. I may, however, offer suggestions from my own experience. Exhibits and demonstration experiments can be arranged as for a conversazione. The master apportions the work to groups of boys and lets them prepare the experiments and exhibits, make sketches and charts, prepare the history of the subject and give the explanations required. On suitable days in the year the conversaziones are held. The exhibits are left up and in working order for the instruction of the Science classes. Good use in all parts of the school may be made of this co-operative work. A small journal may be printed as a record of the exhibits ; it will also serve for a guide and for encouragement.

Another method is to give a course of experimental lectures to the whole school, or to a division of it, provided always that the laboratory work is not being neglected. It seems necessary to emphasise the importance of the boys doing regular laboratory work in exact measurement *pari passu* with the lectures ; otherwise these lectures will fail in their purpose.

Given this constant practical work, boys will come to the lectures with their eyes open and ready to give real help in preparing them ; and there is a great host of experiments to select from. I have made a list of books which are amongst the classics of Experimental Science, and they will give plenty of scope for lectures. There are, for instance, Tyndall's *Heat* and *Sound,* Thompson's *Light Visible and Invisible,* and Perry's *Spinning Tops,* each offering a large number of experiments within the capacity of boys. A course of lectures once a year in Astronomy can be given ;

or an organised course on the History of Astronomy, following Lodge's book, *The Pioneers of Science*, a book which might well be in the hands of every boy. Again, the work might follow the lives of great investigators in Science, and there are, fortunately for us, a large number of interesting lives of scientific men, and they are all full of inspiration. Original papers should be consulted, if the whole value of Science as an instrument of culture is to be appreciated.

It may seem strange to urge the use of such books for Preparatory Schools; but in teaching History you like to bring boys to the sources, and in teaching Science little boys may be introduced to the original experiments of some of the founders of Science.

I need mention only one of these lives of men of Science. *The Life of Faraday*, by the late Professor Sylvanus Thompson, is a truly great book. *The Researches of Faraday* is also invaluable. They have fortunately been published and are easily obtainable. Reading these 'Researches' is reading a poem. . . . I think, gentlemen, we may allow that inspiration comes in this way as truly as from the heavens, or from poetry, or from any form of Art. So we, who are interested in the teaching of Science, believe. Do not destroy our belief.

I will pass on to some practical suggestions. There must be boys in every school who have no great aptitude for languages, but to whom Science will come as a relief and an inspiration, setting free their faculties for intellectual development. In such cases, as in others, we need have no fear of specialising. For these boys a general course will retard progress. Such a course is good for the average run of boys, but possibly not for the cleverest, and certainly not for the boys who have highly specialised faculties. The clever classical boy will, however, profit by Science at some time of his school life, and it is very unlikely that his

own subject will suffer ; it is much more likely that it will gain by the change. For elasticity and life, uniformity is to be avoided, and in any kind of examination freedom should be given for individual tastes and faculties ; nor let it be forgotten that the highest studies and methods of study are often enough not to be tested by examination. We may sow the seed, but we shall have to wait for the fruit.

I now come to what, in some respects, is the main purpose of my remarks here to-day. Sowing in faith certainly applies to a method of teaching Science which I recommend for young boys of the Preparatory School age. The method is based on the use of machinery and tools and instruments which are now in everyday use. No one need be startled by the inclusion of these machines in a Science course for Preparatory Schools. They are all nowadays common household things, and can be bought at the ironmongers' shops. Engines, dynamos, motors, voltmeters, ammeters, electric lamps and cells, cameras and lanterns, lathes and pulley-tackle, screw-jacks. Twenty years ago you would not have known what many of these meant. I have no doubt that to-day you all possess them. Would that I could make their names sound more musical in your ears. Would you like to read them in musical form ? Then I recommend you to read Walt Whitman, especially his song of the Exposition, a gospel for the schoolmaster who would advance the teaching of Science in schools.

A great change has come over the list of things required for teaching Science since many present here to-day began schoolmastering. And to this list I might add even larger things—gardens, big gardens, and experimental plots ; if need be, the master's house and his garden must be commandeered. In a list which I have prepared, and some of you may have taken, I have enumerated certain experiments which can quite well be done by young boys, and in

the doing of them they will learn without knowing it something of the principles of Science; they will get a workmanlike feeling and intuition of forces and mechanism, and will catch up the workman's name for things, expressive and alive. Incidentally they will learn most of what is included under Physical Measurements by simply doing their job. They will also learn Mathematics in the same way and with the advantage that they will learn it in parallel, and cover a wider area of the subject.

We now come to Mathematics. Practice in calculations can be continued with some advantage in the Mathematical sets. It is a useful thing to give boys continuous calculations to perform; we call it, for want of a better name, Continuous Mathematics, and one period a week is rigidly devoted to it. I have brought with me several such problems—based on current events or practical needs. One further advantage is that such questions are informative. For this you may refer to 'The Haystack,' to the 'Horsepower of a Ship,' 'Trench Fire,' 'Artillery Maps,' 'Food Rations.' It is useful for the master to talk round the subjects for a few minutes before the boys start work. If the paper involves many calculations, matters are accelerated by dividing up the work among groups of boys and combining the results at the end. One other useful change from the ordinary mathematical work is that the results of the calculations can be set forth in the manner of a report; each boy prepares a well-written record of his results, as if it were a report to be submitted to a Board of Directors. One period a week is given to Continuous Mathematics. Except for this period, the mathematical time is spent in the ordinary routine work; 'the old is good.' One advantage of the method is that a boy does not have to wait right to the end of his schooldays to get to those parts of Mathematics which are at the end of the book. On the syllabus

of the mathematical teaching, permit me to make one suggestion based on experience of small boys : the ground covered by the ordinary Mathematics may be extended even as far as the Elementary Calculus and Co-ordinate Geometry, and I have placed before you a Schedule of Mathematics in which this is done.

But where is the time for all this to come from ?

I have mentioned Nature Study, and will refer to it again if the clock will let me ; but just one word as to overloading the time-table. If these subjects are to come in effectively, time must be found. I will take courage, and say that time can be found by trespassing on that given to Latin, to the extent I see recommended by the Joint Committee. Our practice in the Junior School is to give seven periods a week to Latin, and as far as the Classical results of the school are concerned, we have had no reason to change this. Again, extra time can be got in another way. Work done in class-rooms is of an exhausting character, and the period must be short ; but this does not apply to practical work. Practical work will not tire boys in the same way, so that some of the periods may be longer : and as the same kind of work can be followed in other subjects by taking boys to the Library or Art Museum, the number of school hours can be increased. I have placed before you some methods of teaching English and History based upon the workshop and laboratory, and may have time to refer to these later.

You will also find time-tables for young boys, in which the periods are longer and the whole time per week greater than is customary. This can quite well be done if the practical periods in the art-room, library, garden, laboratory, and workshops are skilfully arranged.

Again, in Preparatory Schools there will be cases where even Latin may be given up at the top of the school and

not begun at the bottom, so that ample time can be got for boys to whom Science teaching is even more important.

What kind of Science shall be taught in any given school must rest with the masters concerned. Men must teach what appeals to them, although alert and active men can take up these special studies as they take up Geography, and make a great success of them. The syllabuses may include, in addition to Workshops, Machinery Experiments, Biology, Chemistry, Physical Measurements, Romance of Science, Astronomy—a large enough ground to choose from. In the years between nine and fourteen there is no reason why a small boy should not walk through these fields and learn of the existence of things. Romance of Science may be taken two terms of the year, Astronomy for one; and these parallel with Biology and Chemistry. But into the details of these I cannot now go.

### 3. Science and Educational Reconstruction [1]

I am very much honoured by your invitation to address this important congress, and I am honoured too in being permitted to speak on education in this great city of Bradford. For your city stands out very prominently in the annals of education, and its work is well known by all who have watched educational progress.

You, gentlemen, are concerned with education: you are much concerned with the education which will promote the welfare of the leaders and workers in your industry, and the welfare of the people in your districts. Industrialism has tumbled upon us, and it is an untamed, unruly being, the laws of which are not yet known, and need study. For some thirty-five years—a long spell—I have, in places

[1] An Address delivered before the Members of the Textile Institute at their Annual Congress, held at Bradford, 4th October 1918.

removed far away from the voices of industry, devoted my time towards the introduction into Public Schools of those Scientific and Technical studies which, as I understand it, lie at the basis of industrial life. I have always had before me the work of organising Technical Subjects so that they might give all that is best to give of spiritual and intellectual training. And our object is to send forth from school boys who will be in sympathy with the work they have to do, that they will be privileged to do, and to send them forth equipped for it. You have the same purpose. Your wish is that the boys and girls of your country should have every chance of developing into effective workers in the community, and that they should take a zealous intellectual interest in their work—that they should love their work, love to do it well, ever anxious to mount to higher things.

And one of the difficulties of the immediate future will be to reorganise industrial conditions so that each worker may have the chance of stretching his faculties and of getting the work which will give him reasonably full play for his abilities. The fact that able and clever men are, in the present system, kept too long at work which does not stretch their brains, is a cause of unrest. Fortunately there is a growing consensus of opinion that more freedom for opportunity and for advancement is seriously necessary, and this sympathetic opinion will lead towards a solution. It is also well within the work of a school to promote this sympathy by sending out boys with those intellectual and scientific tastes and knowledge which will react upon themselves and attract them to the workers.

There are two other questions which I will mention before I come to the actual work which may be done in schools. One of the main aims of a good school is to see that each boy and girl is cared for, that each one has every opportunity for development. We must not cast

out, or send our weak ones away, we must keep them in school—we must find out what kind of work will appeal to them, so that they too may move upwards, gain in self-respect, and love their life. And we claim that this is what we would have done in all factories, or in any occupation. It is the essential duty of every nation. We are anxious that no worker should be stunted mentally or physically by the kind of work he has to do. This again is a difficult as it is an urgent problem. It is one which can be studied in schools, and there is no doubt that the attempts of a school to provide avenues of advance for all kinds of boys will tend to bring the right spirit into industrial and agricultural life.

The other question I will mention is this : We must have a full belief in the beauty of the industrial life. We believe that it springs from God, it is one of the works of God, and is divine. If there is anything that pollutes the temple, cast it out ; we must not get our wages in the shops and our love and life outside. It is very true that the labourer little recks ' how near his work is holding him to God.'

I now come to the changes which may be made in schools to promote this attitude of mind amongst boys and girls.

I would make the suggestion that we must not keep the life of school too much separated from the working life of the community. The work in school should be in touch with the home life, and should merge into the life of the community. The schools should be closely linked up with the community life. When boys and girls go home, even to the humblest home, their parents should find that some part of the school life is associated with their own life and work. This principle should modify the kind of work done in schools, so that when boys leave school they should have already taken part in the work which they go out to do.

In the consideration of ' The Reconstruction of Educa-

tion ' it is well to reflect that the present system of education, in its curriculum, in the subjects taught, and in the manner of teaching them, is based historically on the cultivation of dominance—to train a dominant ruling class. This might be right for small communities in the past, but it is not going to work for long in the large industrial relationships. Here the dominance will have to be that of mutual service, but the spirit for mastery has in the past influenced all studies. I sometimes tell my classical colleagues that even Greek and Latin grammar should be carefully studied and rewritten from this other point of view. Work in schools, we believe, should be for service, and should be turned towards the practical needs of life. For this and other reasons I would urge upon educational authorities that the Science in schools should be based upon Applied Science, *i.e.* upon technical studies. Applied Science is practically a product of the last forty or fifty years, and it has not to any great extent yet come into the schools ; but our industrial and our social life depend upon it, and, moreover, an early knowledge and intuition of Applied Science will develop those sympathies which will react upon the social problems.

There is a vast field for labour and wide scope for research in the applied sciences. The harvest is plenteous, the labourers few. Applied Mechanics, Physics, Chemistry, Biology—and we may add Economics—where experiments and investigations are needed, should form the basis of some work in schools.

Applied Mechanics, with its experimental laboratory, engines, motors, machines of many kinds ; an engineering drawing-office where boys can work from the age of twelve upwards ; experiments on rotating bodies, on balancing ; and, much needed to-day, experiments on ship models in an experimental tank ; an air tunnel for experiments on

THE HEAD IN THE GREAT HALL

propellers, the study of the screw, testing material and so on. There are many practical things to choose from: some boys can do one, some another—at all ages boys and girls can come within the influence of the whole range of work. This larger kind of experimental work can well be done both in elementary and secondary schools. Moreover, the doing of these experiments teaches many subjects: Mathematics, Drawing, and the principles and laws of Science. This is of the essence of the method, but I need not dwell upon it now.

Again, there is a wondrously large and romantic field of experiment and research in Electricity, Heat and Light. There is the working with engines, dynamos, motors; the romance of wave motion, light, visible and invisible. And there is the use of the beautiful standard instruments of measurement. Every great school might well possess a standardising laboratory—a miniature, very miniature National Physical Laboratory—so that the boys may become as familiar with the volt, ohm, ampere, joule, diopter, with the indicator, potentiometer, spectrometer, as they are with the foot-rule and the thermometer. Many of these words find a place now within the vernacular, and the things themselves are becoming common household articles.

This extension of the boundaries of common knowledge may also be said to apply to Chemistry—although the methods of experiments are perhaps not so familiar. Chemistry gives much to select from, and every neighbourhood will suggest investigations. In addition to some of the standard chemical operations, schools will—and I think many do—take on such work as the extraction of the by-products of coal tar, which is now almost a mathematical problem; the manufacture of liquid air and experiments with it, and experiments in high and low temperatures;

the rapid analysis of alloys; and a large number of other similar experiments.

There need be no fear that the ordinary elementary science, with the well-known elementary experiments, will suffer. Much of this is included in the larger work, and in many cases the time has now come when the theories and the well-known elementary experiments may be taken as known, so that we can start in schools with work immediately needed to-day and move onwards. This larger work will be found more inspiring. It brings boys quite early to the limits of knowledge and stirs up the imagination, and develops their inventive capacities. There is also a wider scope for original ideas.

With special plant of a practical kind much work in the nature of tests of material, elementary researches, taking part in production (there is plenty of such work now in munitions), and even in some cases investigation of social conditions, can be undertaken by masters and boys. The master has at his disposal a large number of eager assistants, and he will find himself with a live and active occupation, which will be of double value to the community and will improve his status.

The school will not be a place so much where a boy comes to learn lessons, but a place where he comes to create something. Too much time is often spent in learning about tools, without using them. Mathematics, languages, and the elements of science are largely tools. Only a limited number of boys can go on with these to the high creative stages—a few mathematicians, a few high classics, a few students of philosophy. But the greater number should turn their creative faculties to other subjects.

This brings me to the new-comer into the realms of science, Biology, which is essentially a study requiring the use of newer tools and different faculties. The history of

Biology comes almost within our own days. Many of us can look back upon the rush of young men into the study under the miraculous influence of its great founders. And Biology touches all parts of the social life : the investigation of disease, the practice of medicine, its application to agriculture (as yet but in its infancy), and the application of its methods in social economics. The study of Biology is pre-eminently a study natural to boys and girls. Like all science—but perhaps more obviously so—it touches the faculties of art in all its expressions. Biology should stand in schools parallel with mathematics and languages and be studied throughout the school. The taste for Natural History, the exercise of observational talents, the outdoor life, combined with laboratory work, the use of the microscope, the invigorating effect on many boys and girls of garden and field labour, make Biology an inspiriting and seductive educational work. Many find their intellectual salvation in it, when mathematics and the mathematical sciences have become for the moment stationary for them ; we know also that biological science will tax the special abilities of the most talented boys.

Biology makes heavy demands, yet these demands are well within the reach of any great school or any great community. A biological laboratory of adequate size, with aquaria, breeding-cages, vivaria, insect incubators ; gardens, with Alpine plants, fernery, rose garden—a miniature Kew ; an experimental plot ; an experimental farm ; a museum :—these will give the means for taking up wide studies, including the life-history of man and the romantic history of Biology itself. Much valuable work can be done for the neighbourhood. Here is a short list : an agricultural survey of the district, where a multiplicity of workers is so invaluable ; analysis of soil ; experimental work on wheat and other crops (this can be done for farms

and for neighbouring estates); extraction of fat and sugar; experiments with flour, bread-making; study of British and foreign woods; the study of diseases and pests; and so on.

But science has not yet come into schools in their larger creative way. Science, to be effective, so that it impresses its genius on the minds and souls of the boys, must come in with all the majesty and beauty of abundance. Its demands are great. Science is creative, and changes the value of the things of life. It means change, growth, development, discovery, unrest. It stirs men's thought to new ideals, to high efforts, and sets before us new aims. Its demands are great; nor need we be surprised. As we look over the things of life, when we consider what scientific discovery and the great scientific pioneers and workers have done for the redemption of man, when we read the epic story of their lives, we know that no small claim will bring the spirit of science into the schools.

And the lives of the great discoverers reveal this spirit of science. There is a beautiful book recently published, written by Professor R. A. Gregory. It is called *Discovery*, and its sub-title is 'The Spirit and Service of Science.' It should be in the hands of every boy and girl. To those who know the language of science and can read its message, the book, in this time of great bereavement, is a veritable Book of Consolation. There you can get a glimpse of the mighty heroes of science—Homeric heroes—fit companions of those of whom the poets have sung, all we may be sure living daily in the presence of God, and searching His will.

I will say no more, but return just for one moment to practical details and needs. For this practical work in science a large and fully equipped workshop is essential. I need not here dwell upon the value and power of a good

craftsman's training. It is an impressive thing to see a good craftsman at work—and workshops are the homes of craftsmanship. A good workshop will foster the creative desires, the desire to do and to make. It will foster the love of exactness and the spirit of invention. It will give of the craftsman's skill and the craftsman's joy. Incidentally, shops will help in solving problems connected with workshop management, the study of efficiency, the problems of labour. But the shops must be on a substantial scale. There should be a machine shop with twenty-five or more good-sized machine tools, a small foundry, a carpenter's shop, an engine house, and a smithy. Here, under good craftsmen, good work can be done, and much of it in connection with the work of the district. In a new world the workers need not fear this competition.

Many will, however, still fear that all this work is 'materialistic.' But this is not our faith, for we believe that not in art, or in literature, or in nature only does God come to men, but that He comes in all His works; and it is the mission of schools to reveal His presence in the wonders of scientific and industrial life. This is the great work set before schools to-day—and the call to reveal the true spirit of industry is urgent. We believe that God goes with man into the field, into the factory, the mine; and if there are any things present in these works which pollute the temple, we must purge the temple. That, as it seems to me, is the vital work in the reconstruction which lies in front. We see the dawn of a new creation day—a new era and new prophets are rising. The industrial world will not be left without poets to translate its beauty and art into literary form for minds attuned to read it. Of these poets the great forerunner was Walt Whitman, the 'mystic trumpeter' of the worker's life. His *Leaves of Grass*, especially 'The Song of the Exposition,'

written during the tragic stirrings of the American Civil War, is a schoolmaster's poem.

In this song he builds a school—and his school is for the worker in God's kingdom. With loving and lavish hands he builds spacious palaces for education, with spacious halls, and homes for practical inventions; learning, the arts, the sciences shall all be there; none shall be slighted. This, I am sure, will appeal to the citizens of Bradford. But I will bring the imagery down to a practical working suggestion for new schools after the war.

A spacious science building with a large hall for Physics, Engineering, and Drawing Office; a commodious laboratory for Chemistry; a similar one for Biology; a metallurgical laboratory; a standardising laboratory; a room in which to exhibit practical inventions, the Hall of Invention, with a few class-rooms. A similar building of equal size for workshops. Another for literature—a literary workshop, organised on the plan of a museum, with work-rooms for the assistants. The large hall for the library, with books, maps, charts, diagrams; an art-room with pictures, maps, charts; a long wing for French and other languages; another for Geography, Ethnology, Philosophy, Economics. Here several forms can be engaged in research. And some of the work at least should bear upon the questions of the day, or on those of the immediate future, so that boys shall go out into the world with their minds attuned to the inquiries and changes, the needs and progress of the time.

To-day the question of labour and capital may quite reasonably be considered. It is astonishing how much boys can do in this. They can bring data and method from their own home surroundings and circumstances, and can discuss the conditions, and suggest plans for the amelioration of the people. They can study the various attempts at the

solution. It is interesting, too, to see that the boys will suggest using these newer methods of education in the larger life in the villages and towns. For example, at school they have taken part in literary and scientific conversaziones, and the suggestion occurs to them that these conversaziones could be held in the agricultural and industrial towns and villages. We schoolmasters ought therefore to have in mind the application of our educational methods in the larger sphere of education beyond the school days. Again, the problem of Africa must come into importance in the near future, and a good knowledge of its history, discovery, geography, products, races, with their characteristics and relationships, should be gained. Again, modern languages are needed, and boys should gain a working knowledge of many languages, not for diplomacy or business, but rather that they may grow into sympathy with Eastern and other races, and know something of their ideals of life.

A large and spacious school, as the poet tells—a group of palaces ; and here

> 'Somewhere within their walls shall all that forwards perfect human life be started,
> Tried, taught, advanced, visibly exhibited.'

And so may the industrial workers go on with faith to build up their great work—and join in the belief and inspiration of the prophet when he proclaims the urgent work of to-day :

> 'Mightier than Egypt's tombs,
> Fairer than Grecia's, Roma's temples,
> Prouder than Milan's statued, spired cathedral,
> More picturesque than Rhenish castle-keeps.'

And he might add, more enduring than all these :

> 'We plan even now to raise, beyond them all,
> Thy great cathedral, sacred industry, no tomb—
> A keep for Life.'

## 4. Education and Industry[1]

The object of this paper is to describe in practical working terms an organisation of schools which shall be based on a close association with the manifold needs and labours of the community life. At the outset I may say that the proposals will refer—even if not specifically so stated—to all types of schools, from the Elementary to the Public Schools. It will be seen that the change needs a change in the ideals which have usually prevailed in schools in the past. In the community life the one urgent thing to be done to-day is to reorganise industry and the conditions of labour. This reorganisation may require quite organic or even anarchic changes—and for these changes the ideals of boys and girls must be changed, and to prepare for this change is the urgent work of the schools.

Before I come to the proposals for reconstruction of schools, I will state very briefly some facts in industry which are now meeting with acceptance.

1. Modern industrial life has come in with a tumultuous rush, in a haphazard, ungoverned way, through the activities of forceful, capable, and industrious leaders who have made use of the scientific discoveries of another type of men.
2. The shrinkage of the world, and the growth of population which followed, has led to fierce competition; and this spirit of competition has ruled everywhere.
3. In the ungoverned rush for production all sorts of methods are adopted which seem to be justified by their effectiveness. An example is the modern system of efficiency, at first sight captivating to

[1] An Address delivered before the Reconstruction Council in London on 11th February 1919.

the intellect and the desires, but yet a method which needs very careful study.

4. Now men are beginning to believe that the first product of industry must be for the worker; that the worker should grow physically, intellectually, spiritually by his work.

I shall claim that the work in schools should be permeated by Science and by the scientific method and outlook, and it will be found that Science itself does not set all this store on efficiency. Efficiency, I believe, is entirely contained within the first, or quantitative law of Thermodynamics. But entropy based on the more elusive qualitative law is concerned with the quality which leads to the giving up of life to others. We must see to it that whatever the efficacy may be, the entropy of industry be high.

The principle that the first product of industry must be the worker leads to great organic changes. It will lead to no less a thing than closing down certain productions, certain classes of occupations, certain industries or processes. It will lead to a modification of repetition work; and to adjustments in organisation. I hope to show the bearing of this on our educational methods, and how the ideals implied may bring some help in diagnosing Labour unrest.

It will be seen that most of the changes needed to-day depend upon international agreements, and a league of nations is essential, not, I think, to end wars, but to make the change from competition to co-operation possible.

We are concerned to-day with the part education must take in this change of ideals of life. It is not too much to say that without the influence of a reconstructed education the way to change in the ideals of men will be hard to find.

The change has to be made from competitive methods and ideals to co-operative methods ; from the spirit of dominance to creativeness ; and the present system of aristocratism in schools must give way to democratism.

Competition holds sway to-day in industrial life with disastrous results. Every employer of labour feels this, and wrestles, and would be glad of change, but he is held in the grip of a system. Every one feels that competition destroys the creative, inventive life—and is the seat of unrest. And yet the spirit of competition holds sway, not in commerce only nor in diplomacy, but in the schools. Our public schools are professedly schools for training a dominant class ; the aims, the educational methods, the school subjects and their relative values, the books read, the life led—are all based on this spirit. The methods are largely competitive, possessive. With, as I believe, tragic results in industrial life this same system, with the ideals behind it, has been unwittingly impressed on the working class in the elementary schools.

If organic changes are to be made in industry, the education in schools should be radically changed—from competition to co-operation. It is curious now to think how in older days all co-operation was crushed out—except in games. Boys were not allowed to help each other, or get help from books. They were rarely outside a class-room, and in the class-room they were lectured unto, or examined and arranged in order of seeming merit. Co-operation for the more athletic boys was left to games—hence the fame of games.

The change which I am advocating will demand a new organisation, and will call for a new type of school buildings, and new value of subjects. The new-comer Science, and with it industry, which springs out of it, must take a prominent and inspiriting place in school, and in every part of

school work. It is not sufficient to say that Science should be taught in schools. The time has gone by for this. We claim that Scientific thought should be the inspiring spirit in the school life. Science is essentially creative and co-operative, its outlook is onwards towards change, it means searching for the truth, it demands research and experiment, and does not rest on authority. Under this new spirit all history, literature, art, and even languages should be rewritten.

A new type of school-buildings and requirements will arise. No longer buildings comprised only of class-rooms, but large and spacious workrooms. Class-rooms are places where boys go to be taught. They are tool-sharpening rooms—necessary, but subsidiary. For research and co-operative creative work the larger halls are needed. Spacious engineering and woodworking shops, well supplied with all kinds of machine tools, a smithy, a foundry, a carpenter's shop, a drawing-office—all carried on for manufacturing purposes. Plenty of work which will employ boys of all ages will be found to do.

There will be a corresponding spacious literary and historical workshop with a really spacious library full of books: books on modern subjects, as well as reference books. The building should have wings in it for foreign books—modern as well as classic, history, economics, literary, scientific. As many as possible of the foreign languages should be represented here, that boys may grow up with knowledge and sympathy and respect for other nations, and thus add in promoting wider and deeper ideals of life. Another gallery for geography, and natural history, travels, ethnology.

Here is full scope for a large number of boys of all ages to be engaged in research. It is all of a co-operative character. They can study the various social and economic systems—

from co-partnership to syndicalism; or the Liberation of Slaves; or the League of Nations; or the Liberation of Italy.

Another block will be a Science Block with an Engineering Laboratory, Machinery Hall, Physical, Chemical, and Biological Laboratories—well supplied with apparatus and plant for Applied Science; plant, too, to lead to the investigations of the day; Testing Machine, Ship Tank, Air Tunnel; a miniature Standardising Laboratory; and with this a Botanical Garden and an Experimental Farm.

Another would be an Art-Room, Music-Room, Theatre, a Home of Industry for studying industrial development and industrial life.

This is not a Utopian scheme, but one well within possibility in town and country. To each large central high school should be associated groups of elementary schools, and there should be free highways between them, neither barred by examinations nor barred by expense.

It is sometimes said that everything depends upon the teacher, and that no apparatus or plant is needed by the good teacher. In the light of a wider experience and a wider outlook this cannot be defended. The converse is the case. The 'environment' will react upon the master, and few masters will be found who will not be caught by the inspiration of the bountiful beauty around them.

It may not be unfair to say that the doctrine of independence of environment is born of the desire to save the 'rates,' and is apt to be popular with the new order of directors of education. It is used with disastrous effects, for it keeps all the creative work in the background and holds schools hard to the tool-sharpening subjects and methods.

It is not correct to say that Science teaching necessarily costs more than language teaching. That less is spent on languages is true enough, but more should be spent. I can

imagine a good time of expenditure in setting up a miniature British Museum and National Gallery—and that is what ought to be done. There should be a history 'museum,' a theatre, a cinema—all essential in modern study. Every school should aim at such live teaching of the histories of the peoples.

There is no town or county that could not easily afford the addition to their current expenditure which this wider outlook demands.

Another change must also come. Books on modern problems, strangely enough, are not yet read in schools. For example, the time is overdue for a change of the English books : Burke's *Reflections* and Pitt's *War Speeches*, or Addison, to Ruskin's *Unto This Last* and *Time and Tide*, or to Bernard Shaw, Wells, Galsworthy, and the modern poets. Some would go so far as to give Shakespeare a rest. It is astonishing how the newer books bearing on the large questions of the day, and bearing on the actual life of the boy, strike the imagination of boys—even quite young boys of the upper elementary school age. They stir up the faculties and appeal to a less used kind of imagination. It is surprising, too, what open and live views young boys will reach. And one thing the study of these books possesses, which I hope to dwell upon later, is that they bring the schools into close touch with the everyday life of their homes, and of the community.

Creative education demands that schools should be brought into harmony with the community life, and should take part in the industrial and economic life. When boys and girls go home from school (even to the humblest home) the parents should find there is something their children have done at school which will help them in their work. This means that technical and vocational training should hold a prominent, and not a subsidiary place in the schools.

It is not difficult to see that this kind of work contains within it the spirit and genius of Science. We claim that education should be turned in this direction, with confidence and inspiration. The divorce of industrial life from the life of the spirit is one of the tragedies of the age. It produces calamitous results. A man's work may be of an impossible kind, it may be sordid and destructive of life—and the cure proposed is that he should have shorter hours and more pay. This leads to bad diagnosis of the cause of Labour difficulty, and prevents necessary reforms in the industries.

Employers recognise this and are doing what they can to remedy the evil. A race is growing up, free from the hurry of competition, who have a deep sense of the beauty which lies within the industrial life. They will agree with Ruskin when he says that there are sacrifices which the merchant and manufacturer can make comparable with the sacrifice of a soldier at the front. Ruskin, in his day, saw the dark side of industry, but we shall see industry rise to be a temple of God. That it shall become so means that we must have an intense belief in it, a belief in its creative power—in the creative life it involves when it is not under the influence of competitive methods; and further, and to my mind essential, that schools must not be separated from the industrial life.

Creativeness, the co-operative spirit and method, the vision, the experimental method of searching for the truth, form the unique gift Science and Industry have to give to the 'New Education.' Under the influence of this new outlook all other departments of knowledge must be re-studied. Under its influence the life of school will become active, the workers self-reliant, love abounding. It will make good craftsmen and make the school of use in the community—whether in the manufacturing life or in the

investigation of economic conditions. Incidentally it will give rise to a new body of men capable of going wholly or in part to teaching, and the school will be thus linked up with the life of the place.

It may be well to state that with an education of this kind based fundamentally on Science a capable boy will leave a secondary school with a good knowledge of Science and of its application, with a research attitude towards history and modern problems, and with a good working knowledge of two, or three, or even four languages.

Some examples of this community work may be given—and such work, and the method of it, will be useful after schooldays are over.

1. In country districts there is always an abundance of work which can be done in school. Schools should take the position of ' consulting bodies ' for their neighbourhood. To the school people should come for advice. There are agricultural experiments to be undertaken, boys may be employed under the expert master in making tests of soils, examining seeds, wood, cotton, etc.; analysing the products, investigating pests, forestry, and so on. The school can quite well take on such things as forge work, horse-shoeing, and instruments and tools and machinery.

The methods, too, in school may quite well have some reference to their further use when the boys leave school.

2. One valuable non-competitive method of study is to have well-organised conversaziones—scientific and literary. This is capable of great things and wide extension. It is easy to see how prolific of value this would be to a young agriculturist going out on a large farm. It will suggest methods for co-operative study and investigation in the villages. The co-operative methods are essentially adapted to this further work.

In industrial areas the work would be simpler in many

ways, and some steps can be taken to giving assistance in the factories by relays of boys and girls as part of their school work. So would the school merge at the shops and factories.

3. The study of social questions is seriously needed. Industries would then have a close connection with the boys and girls, and yet boys and girls would be free to follow the best of their own talents and inclinations—the industrial life would not be separated from the spiritual life; and we may hope that some part of this ideal would pass over into the workshops and factories; so that the labourer would learn to love his work better than his wage —for so indeed he would wish to do. And the faculties of the worker would grow. The method of the work would follow the method of the school, as it is doing more and more in our own land and in many a workshop. For the spirit is with these ideals; the practice difficult for any single firm to carry out. Hence is the need for radical change in schools. Firms are being driven to start trade schools of their own, when they would prefer the work to be done with all the wider scope of a school. And the same enlightened firms endeavour to 'promote' their men.

And here we come to what is probably the natural source of all Labour 'unrest'—the unstretched faculties of the worker. Men there are in any great shops who have intellectual faculties of the highest order, and these faculties are not used, so the greatest possession a man has, and the greatest his country has—the 'faculties' of its owners—is allowed to dissipate. And in the feeling of the mental want of equilibrium, in the slow frittering away of life, there arrives the turbulent spirit. The study of these questions is the problem for our coming international university. The industrial and economic problems involved can only be approached under international agree-

ment. All that has been possible at present in the way of making industrial life pure and holy is by legislative restrictions, often enough rankling to the worker even when needed for his amelioration. Such legislation (Factory Acts, Insurance Acts, wages, hours) does not remove the source of the disease ; at best it only mitigates the worst results. More drastic changes may be needed in the nature of the work—to the ruling out certain manufacturing processes until new discoveries can be made.

So with the work in the shops. Men do not want wages, or shorter hours : these are only symptoms of a disease, and short cuts to amelioration. They are doctoring. What men want is that their work may be such that they can love it, and want more of it. They do not want slaves' work in the shops and a ' dose ' of the spiritual life out of it. So we believe.

Parents, too, would let their children remain at school. As a class there is no one more unselfish and self-sacrificing and co-operative. Boys want to leave school because of the natural urge for making something and getting to business—as they see it at home. To remain at school without joining in some work is unthinkable when they see the life their parents lead.

I may be permitted to insert one paragraph on the unfortunate opposition to this new position which is claimed for Science in the schools. The opposition springs from the belief that vocational work is simply material, having no spiritual outlook. But the truth is all the other way. Unfortunately the present studies of history, art, economy, literature, are biassed by ' possessive ' instincts and education, and we claim that Science and its methods are seriously demanded for a new reading of these things. However, the opposition finds expression in high quarters. The Workers' Educational Union, acting in sympathy

with the Labour view—that vocational studies are to be avoided—practically taboos technical studies. This is reasonable as things are to-day, when a man's work is too often for the profit of others, and for this reason the workers are not in love with their work, and when the day is over they have seen plenty of it; so the best of them go elsewhere for the springs of the spiritual life. But this is all disastrous to individuals and disastrous to progress. What the workers should do is to watch for the spirit in their daily work, for it is the work itself which will hold a man to God—nothing else will.

### 5. Educational Needs of the New Era[1]

We are faced with great problems both in our social and industrial life, and with probably graver problems in our international relationships. Every one recognises that we are in times when no ordinary changes are being forced upon us. The old order of things is passing away, and everything is in a melting-pot. The natural instincts of men and women have been violently stirred and liberated during the war. Of a truth this stirring will be found to be the one fundamental effect of the war. The natural instinct of human nature is liberty, and our soldiers and the women war-workers found themselves free. The soldier in the trenches was freer than he had ever been before: he was free to make the best use of his powers, free to work for his country; free too in his obedience to discipline, which is quite different from the constraint of life in factories or mines. His liberty was not licence, nor was his obedience slavery. It is, I think, no very great wonder that men who have tasted of the freedom at the

[1] An Address delivered before the Luncheon Club in Leeds on 16th February 1920.

Front, and of working for their country, and not for wages or profit, stand outside the factories and mines.

The problem for the new era is to bring this liberty into the working life of the nation. This liberty is not what men call licence, but what Ruskin in a glowing passage calls 'perfect freedom'—the freedom which comes from obedience, or, as we would say, from the perfect command of self, from skill of body and mind, from the desire to create true wealth.

It will be the business of education to prepare for a recasting of ideas, and for a new reorganisation, in order to bring this liberty into the life of the people. And the first step is to reorganise our educational system and ideas. Schoolmasters are deeply concerned with the work which has to be done. The nation has lost no less than 800,000 youths below the age of thirty-five, and schools will have to send out boys of a great dynamic instinct and force to take up the work.

And what does the building up of a new world mean? It means to rescue and uplift the submerged and the least developed, so that they may be stirred to activity of life. It will mean setting each individual free to make the highest use of his talents. It will mean extending knowledge, and applying knowledge to man's service.

What advice can we give our sons? Many of them will go into industrial life, and we can tell them that they will have to deal with new problems. The time has gone by for relying simply upon being a master in industry. The new leaders should realise that the first product of industry must be to the workers themselves—an old enough conception, but the time is coming when for industrial equilibrium and for output it will be necessary to make this product the first consideration of industrial management.

The new management must spring from service.

Many changes must be made both in organisation and in mechanical processes, and these may require experiments and new inventions and readjustments. The organisation should be based on the first condition of the development of the worker, and not on output. We must take the long vision, and not be afraid of making the grand investment. In the near future the country will benefit a hundredfold.

Our young men entering the factories will have to be well equipped in scientific and technical knowledge and outlook. They must be capable and zealous to take active intellectual interest in the work, and must keep their minds open for those progressive changes which will benefit the worker. They must have a firm belief in their work.

Our education should also prepare the worker for his daily work, and make him above all things a good craftsman, so that he may take a lively interest in his craft, as a good man will. The better craftsman he is, the more the work will stretch his faculties, and the more he will be fitted for higher work. And this is the main thing. The first knowledge of a craft should not come from drudgery, but from a scientific and intellectual knowledge of it.

The change in schools from the outlook of dominance to the outlook of service is fundamental, and will revolutionise schools, and ultimately will revolutionise the social system. We have to make our choice between the two aims. Our present public-school system is candidly based on training a dominant master class. But the uprising of the workers and modern conditions are rapidly making the dominant method unworkable, and we are now at the parting of the ways. The change in the aim of schools will transform all the organisations and methods of schools, and my belief is that it is this change that will make the new era.

It is a startling but not sufficiently realised fact that the elementary schools are also based on dominance. In

all their buildings, methods of teaching, subjects taken, the elementary schools are mild copies of the public schools, but emasculated copies. It is not difficult to see that to teach the children of the workers on methods intended for dominance will produce either stupor or anarchy.

The outlook of service will change the methods from competition to co-operation ; will make research the work of schools instead of simply learning ; will require new types of schools, in which the class-room will give place to spacious galleries, workshops, and laboratories. I have often said that in addition to workshops on a manufacturing scale, and to scientific laboratories, every great secondary or central school should have ' miniature copies ' of such homes of knowledge and research as the British Museum, National Gallery, South Kensington Natural History Museum, Kew, Zoological Gardens, Rothamsted, and so on. Elementary schools should be miniature guides to the secondary schools, and the secondary schools to the universities—and all guides to the working life of the city or nation or race.

Schools and colleges should be guides to the life of man : ' indexes ' they may be called—and the idea of index is a useful one for any educational authority concerned with the new era. Any one who has been in the magnificent central hall of the Natural History Museum will find the example of a guide, or ' index,' as Sir William Flower called it.

So will the curriculum and opportunities of the school be enlarged, giving greater scope for the exercise and growth of specific talent, and making it possible for each boy to do some part of the work of the community.

The first purpose of the schools is to join in work for the community, and be closely connected with the community life, and so send forth workers into the national life. There

is a wide field for urgent research, upon which the health, development, and even safety of the nations will depend. We have only to mention such names as Pasteur, Lister, and others in the branch of medicine alone to show what great things hang upon research.

Again, in manufacturing and industrial processes there is a new field of inquiry opening out to discover what may best tend towards making the workaday life of a possible life-giving value.

Pioneers are called for over a wide range of subjects, and there is the even greater purpose of enlisting the sympathy and knowledge of the mass of people. More than anything else it is necessary to prepare the soil on a large scale for the reception of new ideas, and so reduce the time-lag between the coming of the ideas and their universal application.

To give some idea of the call for researches I have before me a map of one branch of science—Biology. This science is of comparatively recent date, but already it has broken out in a large number of branches, each one closely affecting the life and energy of a city or nation. Each branch is waiting, not for a few workers only, but for large numbers. Even in the outline map there are shown twenty streams, many just starting on their course, and all of them running down into the life of the community, and each one ready to divide up into numerous other streams. To name a few—Agriculture, Physiology, Bionomics, Bacteriology, Heredity, Genetics, Sociology ; and the map shows cross-streams joining two or more streams ; it shows the converging of streams to form a wider stream, flowing down into posterity.

The field for research is amazing, yet the number of researchers are few. The war showed what could be done by well-organised effort, and how an invention could be

made almost to order. But it must not be forgotten that there is a wide margin between discovery and invention—and for the moment we want discoveries.

The history of discovery is a romance. There is the romance of glass—a wonderful combination of high mathematics, physics, and chemistry; the romance of steel—mechanics, physics, chemistry, and biology; the romance of radium, and the discovery of the parts of the long spectrum between the electrical waves and the X-rays—a large tract of country still dark; the development of heat-engines—yet some revolutionary advance may be made when the molecules of matter come to be harnessed and directed; the romance of coal tar and its synthesis in chemistry. But it is not for me to come and attempt to even mention what progress has been made. My province is the humbler one of just keeping boys aware of the fact that there are vast tracts of darkness which wait the discovery of eyes by which new forces are seen.

But discoveries and inventions of even greater importance are now needed. They are really most urgently necessary.

Research, experiments, and inventions must be brought to bear on the mechanism of the social and industrial order.

1. Investigations to make labour more possible :—
   - (*a*) Organisation.
   - (*b*) Discovery and invention towards this end.
   - (*c*) International relationships.
   - (*d*) New economics.
2. Instincts of man and of the herd.
3. Investigations into the languages and instincts of the races of the globe.
4. The economics of standards of value.

5. Recasting of economics under new basis—rewritten from the point of view of 'rationing' instead of 'supply and demand.'

The harvest is plenteous—the labourers are few.

These maps must be placarded as posters—a new proclamation, calling for recruits to a new army.

A new recruiting poster. A King's proclamation calling for recruits into a new army. A nation should have a great national army of a new type of soldiers, fighting against darkness, disease, and decay. A national army with its commander-in-chief, generals, colonels, subalterns, men. Each county and each city will have its territorial and citizen army.

The call of the era is for a well-equipped army of workers and researchers in the field of knowledge—well equipped. A munitions board to see that all universities, colleges, schools are bountifully equipped. There will be advance guards in the universities and schools—men and women of great courage and daring, capable of sacrifice, pioneers, marching into the unknown. And schools must be the recruiting ground, O.T.C. and cadet corps, all enlisted in the army and working for it. And if I may continue my obvious analogy, there will be a general staff preparing maps showing the progress, the retreats, the marching forward.

Education, we say, must direct itself to the needs of the people, to their rescue and uplifting. No one can have any doubts of this need. On all sides there is a terrific wastage of life—and wastage of life is wastage of capital; it makes the community poor. No one could measure the increase of wealth which would come if, say, ten years could be added to the working life of men. Yet ten years is a poor estimate of the avoidable waste. The whole community should set itself to raise the average working life. Much

of the waste is due to simple things, which only tradition keeps going. But a vast waste is due to tragedies. The tragedy of occupation; of the submerged; of disease; upon which our Gospels, with true creative inspiration, continually dwell.

The needs should be investigated, and results exhibited. There is a remarkable ignorance of conditions of life. A conspiracy of silence and a *laissez-faire* attitude on the one hand, and an inert belief of people themselves that their condition is of the nature of things ('My people love to have it so'), is a perpetual hindrance to improvement.

Schools should make it a part of their work to investigate the conditions of society, and trace the changes which have taken place throughout the ages. In a central secondary school, or public school, generations of boys engaged in the study will accumulate an abundance of facts which will strike the imagination and direct effort. Special investigations should be made into the conditions and progress of the day.

The facts and general trend of circumstances can be exhibited in an attractive, informing, and instructive manner in the form of charts. Such charts of one form or another—and there are diverse forms of them—should be in process of making. The charts will proclaim the activities of man, the discoveries, the difficulties, and aims. They will proclaim all the great work done for the state or city by the great men and women of the past. Not only should this be done in schools and colleges, but I think in all great industrial concerns.

I have a vague hope that such charts might eventually show stream-lines of development, which could be produced into the future. The charts will proclaim the needs of the day, and direct the work.

Every school, every locality, and industry might build

within their boundaries a new kind of chapel, a heritage, or temple. A beautiful building in which is recorded and exhibited all the things concerned. Records of man's great deeds, and of man's progress, and records of his needs. A visible history of man contributed by generations of boys, or by the workers in factories or fields.

But education in the new era will have to concern itself with the welfare of the nationalities and races of the world. We may hope to see a great international university established, to which will be associated all other universities, and through the universities all the schools. Schools and colleges will be provided with ample work of a new character which is urgently necessary if any kind of equilibrium is to be created amongst the nations.

Here is a problem, and new form of business.

It is highly necessary, we think, to have established throughout the world a body of scientific attachés, each with their staff of workers, in order that each country may be able to get a more intimate knowledge of the peoples, their surroundings, their needs. What shall be the duty of these attachés ? We want for the purpose in view good and accurate knowledge of the population, the characteristics and history of the peoples, the climate and natural productions, the potentialities, and social and political relationships. The object again is the needs of the races; what are their needs, and what can be done for them ?

A heavy call will be made for men and women trained in the new knowledge. Workers will be called for who have a familiar knowledge of the languages of the countries ; are capable of a lively sympathy with the religions and ethics ; and so on. A wide enough field. Such attachés too will concern themselves with the intellectual and industrial developments. They will supply information to the international university—and schools and colleges will join in

investigating the problems which arise. And this will give rise to a new order of business men ; because ' they will be more than business men ' ; they will make sacrifices equal to those of soldiers at the Front.

## 6. The Service of Schools[1]

The war has left the world in a condition of conflict, and of contending forces striving for some kind of equilibrium. The great masses of the people have been violently aroused out of a slumber of contentment. The instincts of human nature have been set free by the war, and neither men nor women, nor even boys or girls, willingly return to things as they were. Many of their abodes—not excluding schools—were prison-houses, where their active talents were imprisoned. Men do not easily return to this kind of work : they stand outside, afraid to go in.

My object this evening is to try to state some of the fundamental causes—or shall we say diseases ?—which seem to lie at the root of this condition, and to consider how education may be directed towards their discovery and remedy.

It will be generally conceded that education cannot in these crucial days be left secluded in seminaries, outside the life of the nation. A great principle of education must be that the work in all our schools should in no small part be directed towards the consideration of the needs of the nation, and that the outlook and methods of schools should be such as will develop the ideals which are in harmony with modern progress and will lead to the change of thought and habit upon which a reconstruction of our social mechanism can be made.

[1] An Address delivered in the Great Hall of the University of Leeds on 16th February 1920.

We claim that schools should take an active part in the social reconstruction of the nation. Such a purpose will act as a guiding principle in the building up of a new education for the new era which lies before us.

Schools should be altruistic in their aims and methods, and should be based on service. Hitherto, as every one knows, the traditional methods of teaching and learning in the school class-rooms have given little scope for service or co-operation, and have indeed accentuated the anti-social spirit of competition, and damped down co-operative efforts. This result of the present system of education has been recognised by the public schools, and schoolmasters have been anxious to give boys some opportunities for service, and hence there has arisen a number of public-school 'clubs.' But such service is of a limited character, and asks for no great sacrifice.

Education for the new era calls for more direct service in the work of schools, which may exact the sacrifice of change of belief and outlook—perhaps the greatest sacrifice and service man can give.

A first principle of the education I am proposing will lie in service—service for the locality, the state, the race. We shall see that this will lead to a linking up of the various grades of schools and the universities, to a greater wealth of abundance in schools, and to the study of the conditions of the social life.

The one aim of schools is to add to the life of the people.

To engage in this service it will be the first duty of schools to make investigations into the conditions and needs of the people. The boys and girls (and I may say here that as a rule I will use the word boys only, although everything I have to say applies to girls)—boys and girls will make researches into the history and progress of man, and they will

trace the development of the social and industrial life. There is an abundance of work to be done in collecting the facts, and it is of first importance that every community should get full knowledge of the facts ; there should be no conspiracy of silence. And it is even of as great importance that the boys in the schools who will have to deal with the facts shall have their share in the inquiry, for in this way their minds will be attuned to the work which lies before them. It is this ' attuning ' of the mind which is the main function of a school. There are many tragedies in life, a world of unrest and conflict, and man slowly mounts upwards. We may claim that the highest education, the highest of humanities, is that which comes through a practical study of, and an active part in, the development of man. I make no excuse for accentuating these vital questions, or for bringing them into the front rank of the educational outlook. There is little else of any moment to think about ; every one feels the immediate importance of them, and it is clearly the work of education to know about them, and to adapt its methods and organisation to prepare the way for the change of thought and outlook through which some result may be reached.

For organic changes are desired both in thought and aims to enable the nation to deal effectively with the rising issues. Everything will depend, as we believe, upon the spirit which the schools may create. The schools must be the source from which a transmuting and transfiguring spirit is breathed through the thoughts of men, and their work must be direct work for the community.

There is a large field for inquiry, and abundance of work waiting to be done. Much of it is of a kind which can quite well, and with many advantages, be done by the masters and boys of our elementary and secondary schools, and by the universities. Much of the work is also of a kind that

requires massed labour. A careful consideration of the work will show that it has high educational powers.

It is because I believe in the educational value of the community work and of its influence on the methods in schools, that I am venturing to dwell upon the importance of the careful consideration of the needs of the nations.

Schools should be miniature copies of the world. We often find that methods adopted in schools are just the methods we should like applied in the state. We should, in fact, direct school life so that the spirit of it may be the spirit which will tend to alleviate social and industrial conditions. I will give an example of the kind of influence the ideals and methods of a school can exert on the working life. I will take a condition of labour which is now recognised as probably the greatest of tragedies. It is the slow decay of the faculties of crowds of men and women, caused by the nature of their employment—the tragedy of the unstretched faculties. So common is it, and ordinary, that we pass it by on one side ; but no one can go into a factory without seeing workers engaged in work which is far below their capacities. Decay sets in, and the death of talent and enthusiasm, the inspirer of creative work. A little thought will convince us that the process of decay of such a delicate and vital organism as the brain is bound to set up violent, eruptive, destructive, anarchic forces which go on for several years. A recent writer in the *Times Educational Supplement* (and this paper cannot be called revolutionary) says that the tragedy of undeveloped talent is being seen more and more to be a gigantic waste of potentiality and an unpardonable cruelty. It is a tragic disease and produces in early life startling intellectual and moral disturbances, which are the natural sources of unrest. As years go on a mental stupor sets in, and there is peace, but peace on a low plane of life. The loss to a community by this

waste is colossal, and it is not too much to say that the output of man could be multiplied beyond conception.

Schools should send boys out into the industrial world whose aim should be to study these tragedies, and by experiments, by new inventions, by organisation, try, we may hope, by some of their own school experience to alleviate the disease. To my mind this is the supreme aim of schools in the new era.

I may perhaps illustrate the importance of school methods by the following example of school method.

It is the object of schools to do the best that can be done for each of its members—masters and boys. When a master joins a school he should find plenty of work to engage all his interests and capacities, and feel that he has a problem before him—that he is doing something for the state. No boy should be neglected, nor rejected. The first duty of a school is to see that each boy is growing in capacity and zeal. It is our duty so to organise schools that every boy, weak or strong, shall be able to make use of his special capacities. We must search for latent talent, and provide the means in school for exercising it. The power of a school and its influence depend upon the zeal and enthusiasm which can be aroused in each member. They depend much more upon the zest aroused in the whole body, not one lacking, than upon the so-called capable boys. A school, like any other community, is a medium through which the spirit works, and this medium must be made elastic, resilient, energetic in all its parts.

All parents will agree to this. Many things must be done to secure that no boy shall be left outside the stream of the school life. Every effort must be made to enlist his services. Schools are useful practising grounds for the larger school of the industrial life. Things we can do in school—and there are many things that can be done which would

shock the schoolmasters of days gone by—are just of the kind which a director of labour could try in his factory—as I have reason to know is being done.

It is not sufficient to urge the promotion of men of talent. It is very true that some few men rise through their brains, their ability, their character, to the highest positions; but the real and serious necessity is the raising of the great average. For it is necessary, of course, that the able men should have the fullest opportunity, but it is more important for the effective growth of the nation to rescue the submerged, and to raise the average. This must be done, even if the drastic step of closing down certain operations has to be resorted to. In schools we can close down on certain sides—even the regulation mathematics and languages—at an early age; we can introduce other studies; we can adopt what may be called intensive culture. All sorts of methods can be tried. So in labour.

To enable schools to carry out this prime duty, *i.e.* to make the highest use of each member, which is to say to make the school highly efficient, it is necessary to have a wide range of subjects in the school. We shall see what changes should come over schools. They must be built in a large and spacious manner, the class-rooms being replaced by halls or galleries, in which the children can move in the midst of abundance, and do and make and research; not confined to a class-room. We shall see how much wider the range of masters must be. We must have the crafts well represented, and a wide range of science, with workshops, scientific laboratories, gardens, fields. Also several languages will be taught, and there should be a spacious library, and art-room, and museum. The methods will change from learning in class-room to researching in the galleries; from learning things of the past to searching into the future; competition giving place to

co-operative work. And somewhere within the field of work each boy or girl may find his own part, and so take part in the creative life, and grow by doing it, and be 'bitten' with the desire to do, and gain in purpose, in determination, in self-determination, in confidence, and outlook. My own view is that at an early stage every effort should be made to get a boy at 'grip' with some part of knowledge, and that we must not be afraid to specialise at the early ages of fifteen to seventeen, for when once a boy has been caught with the love of research he will go on, and can widen out at a later stage. In fact, he will find the need for extending his knowledge and capacities. Examinations tend the other way, with, as I think, disastrous effects on many a creative boy. In those middle school years we must give boys their special opportunity, and not be afraid to close down subjects. It is fairly clear that the ordinary class-room subjects are worked at too long; very little progress is made, and time is wasted. Examinations of a general character are, I believe, just the reverse of what is needed for the larger number of boys. For true community service we constantly find examinations would be a barrier—they are of the possessive, dominant order.

To raise the average, to raise the lowest, is the aim of the new education, and of the new industrial life.

To reach this aim will require the reorganisation of elementary and secondary education, and it will require the co-operation of Labour with the directors of Labour. I may add that the nature of the control of industries, whether Capital and Labour, or some of the controls which are before the country, from co-partnership, co-management, to syndicalism, is not of organic importance. It may be the means to an end; but the end should be a true diagnosis of the disease. Efforts are continually being

made to alleviate the distress and unrest caused by the deadly nature of dull work. A man's work becomes dull and mechanical, and hence the cry goes out for shorter hours and higher wages. But the workers know quite well that shorter hours and higher wages are not cures. Neither of the two satisfies the natural instinct. The natural instinct, the natural hunger, is to grow, to progress, to create, and to work. The true need of the workers is to have that kind of work by which their natural hunger may be satisfied. Higher wages and shorter hours are symbols only of that more effective life, for which they instinctively, if unconsciously, crave.

Ruskin, who spent his life in the interests of the workman, dreaded the coming of industrialism, and for the reason that it would destroy the workman's love and zest for his work. He believed in his day that industry was malignant, and should be annihilated. He saw it coming on with a relentless force. Ruskin's followers have proposed the simpler remedy of leaving industry fundamentally as it is, and doing the best for people outside it. To those who have visions of a great reconstruction of industry this attitude appears as ' the great refusal,' but at the moment it is the method of alleviation proposed by educational authorities and by the leaders of Labour—the latter from a natural dread of the further exploitation of craftsmanship. The policy proposed and insisted upon of providing entertainment, or of shortening hours of labour, or of organising literary and non-vocational studies as a relief, to make amends for the character of a man's life-work, is, I believe, unsound. It will have the effect of making the average work more impossible, and will lead to more anarchy in life. The life which consists of dull bread-winning drudgery, with the admixture of pleasure, is unbalanced, and leads to violence. To cultivate a man's

literary and artistic faculties whilst he has to remain at dull mechanical work divides his life into two antagonistic states, and drives men to rebellion or death. 'The question for a nation is, not how much labour it employs, but how much life it produces' (*Unto This Last*). A man should gain more of life by the work he does, for if not he is a drudge, a sick man, and will want medicine and narcotics. The workers instinctively, if inarticulately, want the disease eradicated. From my own knowledge of the industrial north I can say that whenever the workers have had the opportunity to plan their own education they have always gone to technical, vocational work. The cold hand of authority has constantly closed down these aspirations and efforts of the workers.

If we are to educate a race of workers who will find all their salvation in their ordinary work, it is of extreme importance that the boys should get their intellectual, spiritual, and moral stimulus from 'vocational' work through the spirit of co-operation and service. 'To teach the average man the glory of his daily work and trade.' As things are to-day, with competition on every side, this is not an easy thing to get in the factories, and for this reason I confess to great fear of 'works schools,' and hope that the educational system of the country may include in it that technical preparation which is demanded by our industries, and the value of which for the individuals is inestimable. If the schools do not give this education the works will be compelled to do so, on account of the constantly increasing need of scientific, skilled workmen. It is the nation's duty to develop the craftsmanship of its people. The war showed the need for a wider and more abundant capacity of diverse forms of simple crafts, both among men and women. Those responsible for work in schools ought to have no

fear of scientific and technical education in the high aspects of life. We need have no fear of science or of industry, for out of them will spring all that is best for man to think or do. 'Little recks the labourer how near his work is holding him to God, the loving labourer through space and time.' There will come a new creative day, when all the labours of men and women, all their labours which add to the wealth of man, will take upon them a new fashion. Not only within the realms of nature—wild nature, uncontrolled by man, and of which the poet sings—will God walk, but His presence will be manifest in the beautiful and romantic realm of man's genius and endeavour. No one who has been trained in science can go into great laboratories, or into well-organised factories or workshops, nor can he study the lives of the creators of science, and know something of the romance of science, or of the exact measurements made to determine the standards, or the history of a great invention, without feeling that it is all the spirit of humanism.

To impress the imagination of the young, science and the crafts, romance, inventions, discoveries, should be spread in abundance through the schools. The specialist will get inspiration from apparently simple things in nature, or through experiments, but to impress the average man, to excite the imagination and create enthusiasm, all these works should be offered in great wealth. Moreover, there will thereby be given opportunity for all talents and tastes.

The school should have spacious workshops and laboratories, abundantly supplied with plant and apparatus and inventions—inventions kept up to date. There should be gardens and experimental fields and galleries of history. Elementary schools should have their own spacious fields, indexes of the larger schools, but the schools should be linked together, and the elementary school-children be free

to wander about the wider fields of the central school and do work there.

Here is a list for a large central school :—

1. Wood and metal workshops, fitted up on a manufacturing scale.
2. A workshop for local crafts.
3. A forge, smithy, foundry.
4. An engine-house, with testing plant.
5. Two or more physical laboratories—pure and applied.
6. One commodious engineering laboratory.
7. Two or more chemical laboratories—pure and applied.
8. A biological laboratory.
9. A natural history gallery.
10. A biological garden—10 acres, and other gardens.
11. An experimental farm—30 acres.
12. A hall of industry.

These rooms should be spacious, and many of them communicating through wide arches. Spaciousness is of the essence of the work—and it is spaciousness that is wanted in the elementary schools, and through the schools spaciousness into the homes of the people ; and life.

In the homes of science and the crafts good work can be done for the community. There is no reason why schools should not take the part of 'consultants' to the neighbourhood. The boys can make special parts of machines or instruments in the shops, can do experimental work, can carry out tests (and many of these require a large number of workers).

Such work will lead to co-operation, and will evoke the spirit of science. And science is the great gift of the age. The great awakening during the last hundred years has been the scientific revolution, but notwithstanding its amazing effect on the mechanism of society, the revolution

has not appreciably penetrated the schools. Yet it is natural to expect that science, the new spirit of the age, should ultimately become the bedrock of the new education. The new education, we claim, should be founded on a spacious and live scientific and technical education—in all the schools.

What we call the scientific spirit is the creative spirit of all ages, but it is reincarnate in divers forms. To-day it is manifest in experimental science. And the work makes strong appeals to the majority of boys and girls. It is natural to believe that this spirit will best come from the mass of boys, through their active practical work in the workshops and laboratories of science. The spirit of science is the spirit which will direct the destiny of the industry it has created. The spirit of science leads to change and growth. It is the spirit of democracy, and always tends to freedom, and to liberation of the talents. Its methods consist in testing and researching. It doubts the traditional methods and symbols. It criticises and makes new standards, and alters the values of things, so that it is troublesomely alive, and at times annoying. At the moment it is beginning in a new era, and is engaged in shattering the traditional economics and politics, not excluding finances. Extensive fields are opening out for schools in these directions, and the new era will be marked by the application of science to the social fabric.

The charge is brought against science and its discoveries that they have created a terrible and ungoverned industrial system, ending in this great war. There is truth in this. The facts are acknowledged by scientific men to be these. The discoveries and inventions came in with a tumultuous rush, and set up all over the industrial areas the present industrial system. This system was not followed by a new form of 'government' to control it. During the last

hundred years new wine has been poured in, but it has been poured into the old bottles or wineskins, and these wineskins are now bursting in all directions, with disturbing results.

So there are those who would cry a stay to inventions. Scientific inventions might quite well be closed down for a time, and scientific thought and research applied towards creating the new wineskins.

This would appear to be the main work of science for the coming years. Science must set to work to create new economics, new social relationships, new principles of life, which shall be capable of containing the industrial life. Inventions must, in a larger degree, be towards making the working life of the worker possible.

Schools can take part in this work. If science is spaciously taught it will impress its spirit on the whole school, and will give a fresh stimulus to the older studies, and will add new life and purpose to them. All the studies which have hitherto been called the humane studies will have to be rewritten under the influence of the new ideals.

The application of the scientific methods to literature, art, history, will require what may be called literary workshops.

Corresponding to the scientific block of buildings with its belongings there should be a literary workshop block of buildings. Such buildings should be built more after the manner of museums, with long and commodious galleries or halls, with well-lit bays, or side chapels as they have been called, and adjoining work-rooms. There will be fewer class-rooms, for the class-room is competitive and dominant, and represents the knowledge of things that are, rather than the search of things yet to be.

Such a block of buildings would have as its main feature a library of some size—say 100 feet by 50 feet—well supplied with books, maps, models, and charts. The floor would be

covered with work-tables for research, where boys can work in groups amid all the material they require. The shelves would be deep, for many books should be in triplicate. The books should not be the classics only, but the modern books should be got freely as the research requires. The books must not be borrowed ; they should belong to the school, or perhaps when not in use they could be lent to the free library.

One gallery should be devoted to books in foreign languages. As time goes on, and the research expands, books in many languages will be needed. And many languages should be represented in the school. For many of the problems which will arise the best authorities are written in other languages, and for research into the conditions and welfare of the races of men a knowledge of their language is essential. Masters and boys will have the opportunity of handling these books, they will know of their existence, will grow familiar with the thought of foreign countries, and be capable of finding their way amongst the books, and so secure the best. If I may express a personal view, the value of modern languages rests in this use of them, and not for business or diplomacy or culture. The purpose of the one is creative, of the others dominance.

Another gallery will be for art, history, archaeology. Then there should be a gallery for natural history, for all the science which is directly concerned with the ' making of man,' ethnology, anthropology, economics, geography, geology. One bay would be for discussion, another for recitation or dramatic performances.

The buildings would spread themselves out.

I have examples of syllabuses of ' literary ' work, and explanations of the method of thus employing a form or school. One of these—' League of Nations '—enlisted the services of about twenty-five senior boys, and probably a

hundred junior boys. The junior boys were engaged to investigate the geography of the nationalities and races, their history and development, their religions, and the productions of the countries. Senior boys made similar investigations, but mostly they were concerned with examining the various authorities on the League and in making a report.

Research work is a great stimulus to creative effort. My own experience is that the stimulus of co-operative working is far greater than the stimulus of competition ; in mathematical language the two are not of the same order of dimensions. To create the stimulus the curriculum must be extensive, and include many branches of knowledge. Boys will be promoted, not by an artificial order in form, but by the method of grouping them for special work.

Creative research work does not admit of order of merit, nor can it be marked. No creative work can be subjected to the devastating attack of the red ink and blue pencil. Much of a boy's work must be held sacred ; it is his contribution to the common purpose. In course of time he will find where he has gone wrong, and correct himself.

The true research in libraries will widen a boy's knowledge of literature, and modify it. For most of the examinations, even for the modern higher examinations, the selected English books are rarely of the ' creative ' type, and this although our Bible and the *Pilgrim's Progress* —wells of English—are the great type of creativeness in literature.

The work in schools I have tried to describe or indicate calls for a staff of men of wide diversities of talents and knowledge. The limitations of schools to the ' educational ' subjects seriously restricts the spread of knowledge, and limits the field of inspiration. It also limits the field from which teachers can be drawn, whilst the wider curriculum

encourages the development of all branches of knowledge. With the special work, and its value to the community, the schoolmaster's aims and opportunities are enlarged. His vista will be wider and will open out new adventures, and his life will not lead to blind alleys, or to routine.

The wider curriculum will draw men and women from many crafts, nor, as I think, will the training colleges be so necessary. They would be merged in the schools. The wider and spacious schools will give abundance of work, and of stimulus. A young man or woman coming into the schools will come to opportunities for work, and for growth. The 'abundance' of material—if I may call it that —will be their guide. The larger life will result, we believe, in boys not being anxious to leave school, and the same boys will be willing to return. The cure for scarcity of teachers, as in the case of workmen, is not wages, but opportunity. But the staff must be large. I have here a list of such a staff, but I will not take up your time in reading it—except to say that it provides for masters in many languages, for history, for economics, for Eastern languages, for art, for applied art, mathematics, and various branches of science, for music, and for librarians, curators, workmen. There will be plenty of work for them to do, nor need we be afraid of the expense, for they will create more than they can be paid for in any money.

We may have dreams of a new organisation in which each great central school has linked up with it a number of elementary or preparatory schools, directly or through smaller secondary schools, the elementary school being a miniature of the larger school, not in size, but in opportunity. The elementary school should be what is called an index of the greater school, just as the greater school is a guide or index of the university or college. The staff of the central school and the lower school should be amalga-

mated, so that the elementary school could have the services of the great specialists, whilst the masters in the elementary school could take part in some of the work in the higher school. This would give a wider life, and the life and work of the schools would be strengthened. It will be found that masters love the kind of work. In a similar manner the public school could be linked up in the great towns with the local university, so that you could see from the elementary school through the secondary school to the university and out to the larger world, without barriers erected by examination or cost. Entrance examinations are of the 'possessive' order, and act as barriers. In the *Pilgrim's Progress* it may be noted there are no barriers.

We have dreams of the university being linked up to a great world university—the beginnings of a new 'creative' diplomacy.

So we believe. And from the school the change must come.

'A place, loftier, fairer, ampler than any yet,
Earth's modern wonder, history's seven outstripping,
Gladdening the sun and sky,
Over whose golden roof shall flaunt, beneath the banner Freedom,
The banners of states and flags of every land;
And all around
A brood of lofty, fair, but lesser palaces shall cluster,
And somewhere within their walls shall all that forwards perfect human life be started,
Traced, taught, advanced, exhibited.'

## 7. The Duty and Service of a City[1]

It has been a great privilege to give away the Prizes in your school, and to see the great progress made during

[1] Notes arranged for an Address at the Prize Distribution at King's School, Peterborough, 6th December 1921. (A portion at the end omitted.)

recent years, not only in numbers, which are so seriously necessary for the full service of a school, but in the spirit which animates the school. I had the opportunity a week or so ago of going over the school and could see the aims and spirit within it, and its potentialities. The school struck me as directed by a spirit of enthusiasm—that enthusiasm which, given scope, would give of abundance to the city, and to the state. Also a few weeks ago a party of girls and their mistresses came to Oundle, and it was obvious that they were all filled with the same enthusiasm and ability. It is not effectively recognised that the schools, with all their young life, and all the capacities and aims of the teachers, form a great asset for any community —a great source of creative life. This source is not fully drawn upon, and there is little doubt that schools should be reorganised in order to bring the schools right within the community life. You will agree with me as to the enthusiasm of schools, and that a city should do everything it can to maintain the enthusiasm. The duty of a headmaster, I always think, is to walk about and see the good work being done. For enthusiasm is all the better for sunshine and the gentle dew of heaven, and it is a great function of Governors and Education Authorities.

The chief duty of the authorities is to keep up the enthusiasm of the teachers. And I will tell you why. Both schoolmasters and schoolmistresses have to give of their own life to the life of their boys and girls. Parents send their children to school, not that the children may simply learn lessons, either in languages or mathematics or science or art—but that they may gain life, the enthusiasm of life, *i.e.* the capacity and desire of giving their lives for the life of the world.

But to do this the teachers' lives must be full of joy and enthusiasm; for upon this depends their power of giving

life. And life is necessary if a new world is to be created. Engineers and men of science know quite well the difference between having a quantity of energy and having the power to give it up to something else. The power to give up energy depends upon a mysterious thing called entropy. It is more important than energy itself. Efficiency, which has to do with quantity of energy and saving of waste, is not anything like so important. In all the highest ways of life man is always compelled to act in the most *in*efficient way. If this illustration is not boring to you, I would like to remind you that the law of growth, of development, always depends upon the inefficient use of energy in the mechanical sense.

To build up schools that they may really give life to the community, you must let yourself go, and build with prodigality and enthusiasm, and you will receive your reward a hundredfold.

There is much said about waste and spending—but the greatest waste goes on unseen and unexpected before you. The greatest waste lies before you—it is the waste and decay of capacities, bodily, mentally, and spiritually. We see this waste on all sides—in loss of health, in the unused undeveloped faculties, in the aims of life. It is the most tragic sight to see the neglect of talent—it is the 'sin against the Holy Ghost.' It is the sin which lies before the nation and all its citizens. You can go out into the streets and see life passing away with waste ; you can go into any manufactory and see talent slowly dying. Here is waste—ten thousand times greater than any material waste.

It is the main purpose of schools to give every opportunity for the development of all kinds of talents, and for this purpose a school must be built under the motto of 'spaciousness.' It is for schools to prepare the way for a change in all these things, and to show by their methods,

aims, and organisation what a new world may become. For schools can, as it were, be the miniature copies of a new state—boys and girls leaving them with a new ideal and outlook. And the chaotic condition of the world shows the urgent importance of something being done. Look at the state of things. Science and its inventions have created industry—a new thing, but industrial organisation goes on in the old standards of value. But we are faced with greater problems, for science has brought all parts of the earth together, and is spreading knowledge all over the world. There is now no darkest Africa in the sense that Livingstone and Stanley knew it. By aeroplane all parts of the world can be reached, and all over the world are newspapers and the cinema. We can now listen to concerts given at The Hague, and shortly we shall send the living voice to the undeveloped races of Africa. Charlie Chaplin is probing into the pathetic life of the poor, and H. G. Wells is liberating the latent beliefs of hosts of people —from Siberia to Tierra del Fuego. We may not approve, but the facts are incontestable, and the problem evoked will have to be met by our children. They will have to evolve new orders of economics, new organisations of industries and of states.

For this great service of the youth of the future is the cause for which our sons died at the Front.

But what have these high problems to do with the humble sphere of schools? The truth is, that if the schools are to form the seed-ground of a new world, both masters and boys must have their minds turned towards this new world. The organisation of the school must be based on the new outlook. The schools should take part in the researches and investigations needed for it.

At present schools, and even universities, are largely devoted to what are called brain-developing studies—to

what we call tool-sharpening methods. These methods are pursued in class-rooms; in languages, in mathematics, in science, and in art. Too often the time is spent in 'learning' these instruments of knowledge, but not in using them. I am pleading for a large share of time to be spent in the application of these instruments to the urgent needs of to-day. The current system is comparable with a manufactory in which there is only the tool-room, but no productive shop. As a practical fact, the knowledge of tools is best acquired by experience in their use for a community purpose. On this principle probably less than half a boy's or girl's time should be spent in the ordinary class-rooms. A school should therefore provide great workshops of all kinds and build up to provide community service for all its members. To be quite candid, the present methods pursued, even in science and manual work, are of the tool-sharpening nature. In underlying principle there is no difference between these subjects as defined in the Government Syllabus and the usual class-room methods adopted in mathematics and languages.

## 8. Modern Education in the Service of Man [1]

I have to thank you for the privilege of speaking to the members of this great Club. I have the pleasure of addressing a gathering of men actively engaged in the industrial life of the world. Your club is an international club, and its object is to bend the thoughts of the active men of business, their methods, and their outlook and activities, and the standards of value in the manufacturing and commercial community, towards the one purpose of serving the welfare of man—in the words of the Gospel,

[1] Notes arranged for an Address before the Newcastle Branch of the Rotary Club.

bringing more of life to the individuals and races of mankind. You will agree with Ruskin that the merchant's life involves sacrifice as much as the soldier's. You are international because as soon as any one starts to make changes of organisation which shall benefit all the workers, they find it impossible to do it in one country only. Social welfare or life is a very fluid thing, and it is impossible to create it in one place without the action of something like gravity which sets in motion the life of the whole world. There is no doubt that this fluidity of the world is the main subject matter for investigation to-day. There is no part of the world which is not now being stirred to the depths and in all its innermost parts by the new thoughts and standards of value. These, as business men are best aware, are the problems before us. Well, gentlemen, I may express my conviction that these problems which concern the welfare of man constitute the one, and the only, purpose of schools.

A modern education, a modern school, is only indirectly concerned with the business of training a boy's faculties, only indirectly concerned with what is usually meant by teaching. No truly high or noble thing comes by such a direct route. The work of a modern education in schools of all grades is to impress into the service of mankind and the races of man in every part of the world all branches of knowledge, ancient or modern, all the crafts, and all the capacities, talents, and loves of the individual members of the school—boys and masters. The main purpose of a school is not to teach but to open the vision to the condition and needs of man ; to know something of the evolution of man's soul and spirit ; the drift of his thoughts and ideals. For this reason each school, and in fact every city and factory, should have erected in its midst a building, a temple, for which I have long vainly endeavoured to find a full name. For the moment we will call it a Hall of Needs,

a Temple of Vision. By the generosity and vision of a great engineer and man of business, Sir Alfred Yarrow, we have been able to build such a hall.

Such a building will focus the thoughts of the school and will create vision. The function of a headmaster will be to engage groups of boys, and forms with masters of various qualifications and loves, to investigate problems directly concerned with the uplifting of man. Boys can be associated in groups, not so much by their so-called abilities, but by their natural capacities and temperaments. Every boy, whether a literary linguist, scientific specialist, or craftsman, will find his own work to do in some part of the investigations needed. It will soon be found that in a large sense no one is more important than another—each one is needed.

The work to be done, and problems to be investigated, are of course multitudinous in number.

Here are a few suggestions :—

1. To investigate great epochs in history with the object of discovering what was the essential gift given at the period to the soul of man—what change came to his standards of right and wrong.
2. To investigate in the Biological Laboratory and elsewhere the part which the creative instinct takes in the growth of life—and what part is taken by the combative instinct in man.
3. To study the effects of change of the standard of values on any great theory—*e.g.* to rewrite Marshall's *Economics of Industry* under the assumption that everything is rationed and not sold to the highest bidder.
4. To trace the influence of the creative view of life on such a book as a Latin Grammar, or, on a larger scale, on the *Oxford English Dictionary*.

5. To trace the relationship of a worker (say a miner)—his temperament, outlook, and activities—to the geological conditions of his work and his geographical situation (say the nature of the coal seam).
6. To investigate experimentally in the scientific laboratories and workshops the properties of natural productions of countries, and to inquire into their relations to the native races.
7. To investigate into the influence of the conditions and circumstances of (say) the Chinese, or the question of their relation to the welfare of the British workman.

As I am speaking of Education and Industry, these problems are given. With the welter of resurgent problems before everybody to-day, we cannot put them on one side. The study of them is essential for the organisation of the human forces, for the co-ordination of human life. But there are legions of others of different temper and value—all enlisting the service of boys and girls, old or young, of varying talent and tastes, and of masters and mistresses of varied capacities and activities—all bound together by the same vision.

For the service of the community a school must be built and equipped spaciously. It should have well-equipped libraries, art-rooms, and teaching museums of history, geology, natural history ; it should have spacious laboratories and workshops ; and in the midst it should have built the Hall or Temple of Vision.

With full buildings, staff, and equipment, a school can become a miniature of the world that is to be ; the germ cell of a new world ; it can become an experimental ground for putting to the test new ideals of life and methods of commerce and industry.

There are numerous directions in which the activities of the school will illustrate the workings of new values. I will give two examples.

1. *Competition.* The kind of work which I have mentioned—*i.e.* work in which boys are employed in research or service for the community—is altogether more powerful as a stimulus for endeavour than the desire to compete. Also it will be found that a boy is more stimulated to work for his community than he is to make things for himself, or even presents for his mother. It is to be hoped that this vision of the power of service will pass out from the school into the life of the nations. No competition, no examination for entrance, no punishment, the open door. All parts of the school should be free of access—even those parts which are fullest of valuable and attractive apparatus and instruments and books. Boys should have full licence to use what they wish. It is astonishing how little is lost, how small is the damage done. 'The Spirit and the Bride say, Come. And he that heareth, let him say, Come. And he that is athirst, let him come: he that will, let him take the water of life freely.'

Methods of selection depending upon mental or psychological tests seem to me fatal to good service. They leave out of account the one thing that matters—vision, attitude of mind, will to service; nor do they create this essential factor in the life of the soul. All can be of service; there is no one so poor that he cannot give service. Each individual can give service which he alone can give. In the best sense all are of equal service in the community. But the local authorities and the Universities shut their doors—by scholarship and entrance examinations and other methods. Under a community service such methods would not be needed.

2. Schools should be miniature copies of the world we

should love to have. Hence our outlooks and methods must have these aims in mind. Schoolmasters have great responsibilities. We should be able to say to a boy, We have endeavoured to do such things for you, and we ask you to go forth, it may be, into your father's business or factory and do the same to the workers. Let me illustrate from the workshops. Workshops in a school are by far the most difficult things to carry on along the lines I have in mind. Here are three conditions which must be kept in the shops :—

(*a*) The work boys are doing should not be for themselves, or exercises to learn by ; it must always be work required for the community.

(*b*) Each boy must have the opportunity of doing all the main operations, and all the operations should be going on in the workshops.

(*c*) Whenever a boy goes into the shop he should find himself set to work which is up to the hilt of his capacity. There is no 'slithering' down to work which is easy, no unnecessary and automatic repetition, no working for himself but for the community.

And we can say, and are entitled to say to the boy, When you go forth into life, perhaps into your father's works or business or profession, you must try to do for your apprentices and workers what we have tried to do for you. You too will try to see that every one has work which exacts their faculties—by which they will grow and develop ; you will see to it that they are working directly on behalf of and for the welfare of the community, and not for yourself.

This is your real duty towards your neighbour. It is a vastly hard thing to do. This duty of believing that others are of the same blood with yourself, and have the

same feelings, and loves, and desires and needs, and natural elementary rights ; this duty of setting them free to exercise their faculties spaciously that they too may get more of life—is the real duty towards your neighbour. It is a hard thing. If you think of the works, the factory, the office, it is a hard thing. It involves vast sacrifice—the hardest sacrifice—the sacrifice of belief and economic tradition. We need not be surprised that Christianity has 'slithered' down to an easier and softer level of culture and duty towards our neighbours. But whether the workers know it or not, this hard duty is essential in considering the relationships of our community system and our international system to-day.

It is a hard duty, and boys must be immersed in it in school. The outlook, values, and organisation of a school should be based on the fundamental fact of the community service. By habit of mind, and by the activity of the schools, boys should be imbued with this high duty. It means a reorganisation of methods and aims.

It is hard duty, this duty towards your neighbour—the hardest part being to believe that he has like feelings with yourself and equal rights. The young man went away sorrowful, for he had great riches—riches intellectual or other. Yet the young man went away sorrowful, and there is no doubt that he eventually sold all that he had. This is Watts's vision of it. The young man was at heart a follower of Jesus ; he did not say that the commandment was an old one and well known, that it had been said before in the Haggadah and by Moses ; he did not say that the language was the language of Plato or Philo ; he did not say that it was too difficult and could not be true for every one—he went away sorrowful. We have no doubt that he sold all that he had.

The system of education in the past has been based on

training for leadership, *i.e.* for a master class, and its method has been a training of the faculties. But the sharply-defined line between the leaders and the led has been broken down. The whole mass of people has been aroused towards intellectual creative efforts. The struggle going on in all communities and amongst all races is a struggle to grow and to have more of life. Whether at home amongst our workers, or in India, or Egypt, or Ireland ; or between China and Europe—the struggle is the same. It is a struggle to make progress, and have more of life. This urge to grow is a biological fact. We cannot tell why it is or what creates it—but everything around us has this urge to grow, and to grow in its own particular way. One seed grows into a tulip, another into wheat. We know not how, but we recognise it. And it is precisely the same urge to grow that is causing all this apparent conflict. It is the fundamental creative instinct —the most powerful instinct of the human race, by which the race is preserved. Deep down in human nature lies this instinct ; it is never forgotten, it is always present in the mind. It is voluptuous, anarchic, joyful, violent, powerful.

The other instinct is called the fighting, aggressive, acquisitive, possessive instinct. It is the instinct to acquire, to overcome. It is distinct from the creative instinct even in the biological growth, but the distinction manifests itself more clearly in the community or herd relationships. It has none of the beautiful and life-giving qualities of the creative urge. It is essentially, even in its romance (of which we have plenty), dull, selfish, destructive. It varies its forms from sheer animal force to the dialectical methods which have assumed the names of talent and culture. The same characteristics are seen in the force of the slave-driver, in the forces of the wage-

nexus, and in the dialectical force of the council. These are hard sayings, but for the solution of the problems of the present times it is wise, and necessary, to look facts in the face. At any rate it is well to know of the possibilities, feelings, and loves of the uprising mass. It is no argument that because it is, or seems to be, impossible to set each man free to use his talents to the full, that the man does not possess the desire to be free for the purpose; and it will be dangerous to fight against a growing volume of such natural forces.

But what has this to do with schools? My answer is that if we are to deal with the problems thrown up by science in our industrial system, and our close national and international contacts, the schools must be the seed-grounds of the new thought and visions. It is not sufficient for a modern education that Greek should be given up, followed by Latin; and science introduced with manual instruction and civics. Nor is it sufficient to introduce various methods by which the old knowledge and faculties can be more easily and pleasantly gained.

A much more fundamental change is needed—and the change is from the acquisitive methods to the creative, *i.e.* from the purpose of mastery or leadership to the aim of service.

And the great introduction to service which appeals to all, and is possible in one form or another to all, is science and the crafts. It is very natural that science should now become the foundation of a modern education. All our industrial system has sprung out of science and scientific inventions—and it is to be expected that science and the scientific mind and outlook will be needed for the organisation of modern industry and commerce, with all the changes they have introduced into political, economic, and religious thought and life.

Science and the crafts are of their nature creative, and it is the creative temperament which is emerging out of a kind of chaos into an activity.

Science and the crafts are recognised as the agents for service. What is still held is that special qualities, trainings, and knowledge are needed for directing or managing service. This we claim divides the community into two orders—an order for leadership and an order for service—whereas the creative instincts can only be controlled or directed by instincts of the same kind. Candidly, 'leaders,' as they are called, practically organise service by the method of drive, whilst the creative instinct would lead in the service.

Whatever systems of labour are adopted they fail—because at the bottom of them there is the instinct of mastery and possession. Whitley Councils are failing—because they are not based on the creative instincts. It is very possible that both masters and men on the Council cleave across the plane of creative and acquisitive instincts. Probably the large majority of Labour are instinctively 'possessive.'

The fact seems to be that the nature and power of the creative instinct has little opportunity of showing itself.

During the last century, in which the mass system of industrialism rushed madly into the country, the workers were perpetually engaged in the fight to escape from a terrible condition of a hopeless slavery. This is well illustrated by the life-history of mining, when through a long course of warfare between the master class on the one hand and the workers on the other, improvements in the physical lot of the workers were made from the days when children of eight were kept opening and shutting gates down the mine for twelve or more hours a day.

But the struggle for the next era will be for quite different principles. The cleavage between the members of the community will not lie across the plane between masters and men, for they are now percolating through into each other. The field, too, will be shifted from the national to the international; the units will not be men but races. For the cleavage is across the plane which divides the creative instinct from the acquisitive.

Progress to-day is marked by the spread of the creative instinct. Once this instinct is liberated, quickly it spreads —nor can the spread be stopped by any means at the command of the men of acquisitive instincts. Their power lies in their own herd instinct; in their fighting capacity—now soothing down from the lash to dialectics; and in the traditional venerations, ignorance, and poverty of the mass of people.

There is an innate tendency for creative methods to slide down into the competitive, for they require considerable zeal and activity to keep up. Even science as it is taught in our schools is only Latin in another form. The system by which science is taught with new material or apparatus, whilst still retaining all the traditional competitive methods, is what is known as 'syncretism.' It is an insidious disease. It is static and not dynamic. Its static nature is illustrated by its experiments and apparatus. It is dead.

It is no easy thing to maintain science in a school with its full creative instinct. For science means continued effort, change, progress, doubt, inquiry. The spirit of science constantly marches into the unknown, and takes nothing for granted—but unfortunately most of the so-called facts of science are tabulated in books and are learnt even in the laboratory as dead things. It is necessary to

state these beliefs plainly—otherwise science will be confused with something else.

There are many reasons why scientific invention for industrial output might be closed down.

Scientific discovery and invention are to-day more seriously needed for the rescue of man from the diseases of industrial life—from the diseases of the body, but more than anything else from the diseases of the mind—to rescue men, women, and children from the decay and death of their mental faculties, the decay and death of hopes, loves, and vision.

Science in school must be given in wealth of abundance, and should be ever changing and expressing the spirit of change. No stereotyped curriculum, no graded series of exercise. It should be concerned with the science of to-day, efforts always being made to march with its march. Its laws should never be fixed, but about it always there should be the movement to be transformed. So may the scientific spirit of inquiry, adventure, and love be present.

Science is not only concerned with discoveries and inventions. Science is like music, literature, art, nature—a language. To learn this language is the duty before the coming era. To those whose minds are prepared to receive it, science, both in its romance and its logic, speaks to the soul of the hidden secrets of the Divine life.

It can be translated to others, and the duty of schools is to give some examples of translation. Even in the mathematical science of mechanics are expressed some of the new truths of life. In time no translations will be needed. As you wander about in the laboratories, workshops, and fields of science, the voice of God will speak to you, and revelation will come—as truly as in literature or any form of art.

## 9. Some Obiter Dicta

A PRÉCIS PREPARED BY A PREFECT IN THE SCHOOL

### I.—*Of Schools*

1. Schools should be copies in miniature of the world as we would love it to be.

2. We must not cast out our weak ones—we must find out what kind of work will appeal to each of them. It is our duty so to organise schools that every boy, weak or strong, shall be able to make full use of his faculties.

3. Strictly speaking, the dull boy does not exist.

4. It is not sufficient to promote talent: the real and serious business of a school is the raising of the lowest and so of the general average.

5. Work in schools should be conducted for service and not in the ancient spirit of mastery and dominance.

6. A school should be ' a spacious garden ' in which each boy has been set that he may ' dress it and keep it.'

7. The school should be a place where a boy comes not to learn but to create. Mathematics, languages, and the elements of science are not ends but tools, and these tools the boy must accustom himself to use.

8. The essential value of modern languages lies in the insight which they give into the life and thought of foreign nations, and in the opportunities they afford for convenient reference to the original authorities.

9. The work of a modern school is to impress into the service of mankind all branches of knowledge—ancient or modern—all the crafts, all the capacities, talents, and loves of the individual members of the school, both boys and masters.

10. The main purpose of a school is not to teach but to open the vision of the boys to the condition and needs of

man ; that they may know something of the evolution of man's soul and spirit, and of the drift of his thoughts and ideals.

11. Schools and colleges should be guides to the life of man.

12. Education must prevent the terrible waste of life and talent which at present takes place. By a truer, sounder education the output of man could be multiplied enormously.

13. The waste of life and talent is the real ' Sin against the Holy Ghost.'

14. Schools must be closely linked with community life, and boys must be sent out from school in sympathy with, and well equipped for, the work they have to do. Adult life should be not a breaking away from school, but a continuation and development of school.

15. God comes to men not in literature alone, nor in art, nor in nature, but in all His works ; and it is the mission of schools to reveal His presence in the wonders of science and industrial life.

16. In addition to workshops on a manufacturing scale and to scientific laboratories, every great secondary and central school should have miniature copies of such homes of knowledge and research as, for example, the British Museum, the National Gallery, the South Kensington Natural History Museum, Kew Gardens, the Zoological Gardens, and the Rothamsted Experimental Farm.

## II.—*Of Industrial Life*

1. The natural instinct of the worker is to grow, to progress, and to create ; it is this instinct which causes him to rebel against the dullness of monotonous work. Shorter hours and higher wages provide no real cure to the discon-

tent of the worker; nothing but a sense of service will do that.

2. We must have a full belief in the beauty of industrial life. We must not get our wages in the shops and our love and life outside.

3. The reorganisation of industry must be based as a first condition upon the development of the worker, and not upon output.

### III.—*Of Certain General Matters*

1. Our real duty to our neighbours is to believe that others are of the same blood with ourselves and have the same feelings and loves and desires and needs and natural elementary rights.

2. Perfect freedom comes from obedience, from the perfect command of self, from skill of body and mind, from the desire to create true wealth.

3. The progress of life is the increase of vision.

4. Science is creative, and changes the value of the things of life. It means change, growth, development, discovery, unrest.

5. Economics must be rewritten from the point of view of a 'rationing' system instead of a 'supply and demand' system.

6. Ethnology must attain to a real understanding of the instincts of the various races of man.

7. We should establish throughout the world a number of scientific attachés, all in the service of one great international university. It would be the duty of these attachés to provide us with a good and accurate knowledge of the population, the characteristics, and the history of the peoples, of the climate and natural productions, the potentialities and social and political relationships. Such

questions as 'Do the Chinese really love rice?' will have to be studied carefully, for they are of fundamental importance.

8. Social welfare is a very fluid thing, and it is impossible to create it in one place without the action of something like gravity, which sets in motion the life of the whole world.

9. A nation should have a great national army, a new type of soldier, fighting against darkness, disease, and decay.

10. Man's duty is to estimate continually the good and the evil. He has to perform Psyche's task—to sift out the two boxes, the good and the evil, and re-sort them, and to interchange, if necessary, the contents of the two boxes.

11. Victory and mastery are thin, hollow, dangerous, ineffective.

12. All art tends to become self-absorbed and decadent; the more finished and perfect it becomes, the nearer it is to death. Therefore beware of eloquence.

13. All translations are poor.

14. The only resistance worthy of consideration is that which is self-created; self-created resistance is dynamic; static resistance is artificial.

15. Punishment is bad. Bernard Shaw was right when he bade us 'never punish except in anger.'

16. 'I agree with Nietzsche that "The secret of a joyful life is to live dangerously." A joyful life is an active life—it is not a dull static state of so-called happiness. Full of the burning fire of enthusiasm, anarchic, revolutionary, energetic, daemonic, Dionysian, filled to overflowing with the terrific urge to create—such is the life of the man who risks safety and happiness for the sake of growth and happiness.'

## CHAPTER THE SEVENTH

### THE TEMPLE OF VISION

ONE of the most interesting and suggestive of the later Oundle developments centred upon the building that was given to the school by Sir Alfred Yarrow, in memory of his son Eric who was killed at the Battle of Ypres. Sir Alfred is the chairman of the great Glasgow shipbuilding firm that bears his name, he is necessarily a great employer of labour, and in Eric Yarrow Sanderson found a ready response to his idea of a reorganisation of industry from the schools onwards. He saw in this boy a type of the new employer carrying on a great business as a service rather than a property, and fully mindful of the educational needs and the educational co-operation of every soul engaged in and connected with the enterprise. The new employer was to be before everything else the captain of a company of men.

On a visit to Sir Alfred, Sanderson talked overnight of these ideas and of Eric and of his own desire to give these new conceptions of labour and of the purpose of industrial organisation some tangible expression; in the morning he found upon his breakfast plate an envelope in which was a cheque sufficient to cover the building of the memorial.

And from the beginning he shaped this memorial to be a symbol and reminder of the reorganised industrial state to which the school was directing his boys. The building was to have no use in a material sense; it was to be empty

of chairs and desks and such-like impedimenta, and clear for any one to go in to think and dream. About its walls were to be diagrams and exhibits, but these not crowded or in any way oppressive, to display the progress of man from the sub-human to his present phase of futile power and hope. There were to be time-charts of the whole process of history, and a few of these have been made. As his idea ripened it broadened. The Memorial ceased to be a symbol merely of industrial reorganisation and progress, and became a temple to the whole human adventure. He began to stress first social and then imaginative growth. The charts were to be full and accurate, everything shown was to be precisely true, but there was to be no teaching in the building, no direction beyond the form and spirit of the place.

The realisation of the past is the realisation of the future, and it was an easy transition to pass to the idea of this building as an expression of the creative will in man. In it the individual boy was to realise the aim of the school and of schooling and living. It was to be the eye of the school, its soul, its headlight.

The idea of this ' Temple of Vision ' was still growing in his mind when he died. He had not yet settled upon a name for it, though he had tried over a number of names—a Temple of Vision, which is the name we have taken for it here, the Home of Silence, the Hall of Industry, the Anthropaeum, the Making of Man, the Life Creative, the Soul of the School. All these names converge upon the end he was seeking. This approach by trial, by leaving the idea to shape itself for a time and then taking it up again, by talking it over with this man and that, was very characteristic of the Head.

One colleague says of its opening stages : ' My earliest impression of the headmaster's views as to the Yarrow

INTERIOR OF THE YARROW MEMORIAL

Memorial Building is that it was to form a sort of monument of the progress of Science, in so far as it directly affected the material prosperity and development of man. I think he put this forward as a purely tentative proposal, less as a solution of the problem than as a " jumping off " point, and it was not long before he began to get a much bigger conception of its purpose.

' I have a recollection of his reference to the Science Museum at South Kensington as an indication of what he had in mind at first. As an illustration of this view, I give these facts: a series of photographs was obtained showing the development of the steam-engine and a chart was made for one Speech Day conversazione showing the advance of the locomotive engine. The latter was put into the Yarrow building and is still there.'

Another of the staff recalls a further stage in the development. ' I talked with the headmaster about the Yarrow building in October 1920,' he says. ' He then seemed to dally with a suggestion to name it " The Temple of the World "—he expressed his hatred of the tendency to call it the " Museum." I gathered that his idea was to fill it with charts of all things and all ages, including pictures of at least all the world's great men—then to turn a boy loose in it, thereby to realise his position in the world as a unit of its time, as opposed to the inculcation of any idea of his having a part in his nationality only. His root idea seemed to be that it should be a place for meditation—restful as well as invigorating. Several times he referred to it, half jestingly, as a place for tired headmasters!'

Here is a passage written by the Head himself a little later. The idea ripens and broadens out very manifestly. ' Every school, every locality and industry,' he writes, ' might build within their boundaries a new kind of chapel, a heritage, a temple—a beautiful building in which are

gathered together and exhibited the records of man's great deeds and of man's progress, and the records of his needs. It is as such a " Hall of Needs " that we regard the Yarrow Memorial, and to this end it is being equipped. It is part of a school's work to investigate the conditions of society and trace the changes which have taken place throughout the ages. The facts and general trend of circumstances can be exhibited in an attractive, informing, and instructive manner in the form of charts—charts proclaiming the activities of man, the discoveries, the difficulties, and aims. Many such charts have been put into provisional form for exhibition and revision. Many of them deal with ancient times, but much work has been and is being done in the school on more recent periods, and the results will soon be available. Such charts may eventually show stream-lines of development, which can be produced into the future. They will proclaim the needs of the day and direct the work.'

But it is in a sermon which the Head reprinted that we get his crystallising idea of the House of Vision most clearly set out. Can any teacher read and mark what he has to say without a sense of exaltation ?

> 'Now Moses used to take the tent and to pitch it without the camp, afar off from the camp; and he called it, The tent of meeting.'

'The chapter from which this is taken is well known in the school. It is inserted in the section of Exodus in which a beautiful symbolic description is given of a new tabernacle for man—a tabernacle, a temple, a chapel, a beautiful chapel for community service. But the tent of meeting is not a chapel ; it is reserved for Moses, and is placed without the camp. At the moment of the chapter Moses is " in the mount," and the disturbing, distracting thing has happened. The people and Aaron have cruelly relapsed into

the worship of the old. They have relapsed into syncretism, that most deadly and insidious thing, customary though it is and ordinary, and what is more, approved. The editor of the books of Exodus and Genesis who has made out of his material this great majestic outline of history seems to have wondered how Moses could keep standing amid all the relapses into the old ideas and methods, amid all the "slithering" that went on in unexpected quarters. But he knew. He rescues a beautiful passage from the later of the two prophetic writers—the writer of vision, the mystic, the one to whom the heavens were opened, and to whom angels ministered. So our editor saves this great creative gem of literature and life.

'Whenever in their journeys they came to a place and camped there, Moses used to take a simple tent, and plant it without the camp, afar off from the camp, and he called it the Tent of Meeting. It was not a temple or chapel for service; it was not a place of worship; it was not a place of work. Moses went out to the tent to meet God.

'A temple of vision; a house or home of silence; a hall of needs; the making of a race; the coming of a kingdom.

'And Moses went out unto the Tent, and entered into the Tent, and the pillar of cloud descended, and stood at the door of the Tent: and the Lord spake with Moses. And all the people rose up and worshipped, every man at his tent door. And the Lord spake unto Moses face to face, as a man speaketh unto his friend.

'And Moses pleaded with the Lord for His people, and the promise came, and the vision.

'And the Lord said:—

'"I will make all My goodness pass before thee," and, "My Presence shall go with thee, and I will give thee rest."

'And Moses said unto Him:—

'"If Thy presence go not with me, carry us not up hence."

'Such a temple of vision should be planted continually in every city or town, in every village, in every factory, and in every school. We have hopes that the school conversazione, both on its scientific side and its literary and economic side, will illustrate how this may be attempted. Boys too who take part in the conversazione will learn something of the method—what it means and what it can do—and so be persuaded to make the beginnings of similar things when they go out to their work. We can easily imagine how such co-operative investigation, in science, art, history, could be passed out from the schools into the agricultural districts. Especially would this be possible, and indeed inevitable, if the life of the village or town was joined with the life of the school. Where the school is on a "spacious" scale it will be in close touch with the life of the district, and there will be no clearly marked division between school and after-school life.

'The conversazione will be concerned with all things which touch the welfare of man. The work during the term will in part be devoted to investigations or experiments which are suggested by the problems and needs of to-day. There is abundant scope for all the energies that a school can give, and many investigations to be made for which the massed labour of schools is especially suitable. Some part of the work in schools should be directed by immediate service for the race; some part be immediately inspired by "vision."

'It is suggested that the work in school should not altogether be based on the gaining of knowledge and skill, by the conventional method of school lessons, in school subjects, but that the curriculum should, as confidence grows—and it will grow—in part at least be determined by

the inquiries which are urgently necessary for the communities. We can imagine a central university or bureau also devoting a large part of its attention to the great questions of the race, and thus arousing attention to the drift of things, and awakening thoughts in the minds and souls of those who are responsible for schools. A school then becomes a book.

'A school will grow into a book. It will take upon itself the form of a Bible. Within it will appear the stages in the life of the soul—" the coming of a kingdom " ; the foundations, the building, the furniture, the complex apparatus, the organised beauty. A school—its buildings, workshops, class-rooms, and all that goes towards a great school—can take on the form of a parable. As we wander from one place to another all that speaks of life will manifest itself before us. How life begins, what is needed for its growth ; what shall be its standards, its ideals ; what the nature of its proof-plate ; the craftsman and what he is ; the craftsman in languages, in mathematics, in science, in art; the secrets of nature revealing themselves ; progress, change, vision.

'And boys will go out into the factory, or mine, or business, or profession, imbued with the spirit of the active love of humanity. Some will be called to lead, as Moses was called. They too will plant the " Tent of Meeting," the " Temple of Vision." A return with a new viewpoint will be made to the temples of ages gone by. The Assyrian frescoed his walls with sculptures of the deeds of his hero-kings ; the Franciscans frescoed the walls of their chapels with the life of Jesus as told in the Gospels—the life of the Divine builder, of Him who came to restore a kingdom, by whose life and death a new world was created.

'But the Temple of Vision of to-day ; the new Tent of Meeting. What of it ? It will not have its walls sculp-

tured or painted, for these only change in the minds of men. The new home of vision will be frescoed with the thoughts of to-day, changing into the thoughts of to-morrow. It will express the thought of the workers of to-day and of to-morrow. Generations of workers will go up into the mount, and to them too will be shown the pattern. "See that thou make them after their pattern which hath been shown thee in the mount."'

## CHAPTER THE EIGHTH

### THE LAST LECTURE

IT is very evident that in the spring of 1922 the Head's desire to make some fresh ordered statement of his essential views became very strong in him. We have already given the abstract of his opinions, his ' Obiter Dicta,' found upon his desk. In the spring of 1922 he was asked by the National Union of Scientific Workers to give them an address in London, and it is clear that he saw this invitation as an opportunity to state the faith that was in him once more, and yet more plainly and completely than ever. His title was to be ' The Duty and Service of Science in the New Era.'

He said as little as he could to Mrs. Sanderson about this project. He knew that his health was still very insecure, and he feared her friendly protests. To him it may be that very uncertainty of his health was a spur to get the thing said before it was too late. His mind was full of this final statement of himself, and he toiled at it as he toiled at nothing else that he had ever written or taught. He was very desirous, we learn from two letters he left behind him, that Lord Weir, the great Scottish ironmaster, with whom he had conducted a long correspondence upon the reorganisation of industry, should be present at its delivery. Upon his desk after his death seven separate drafts, and they were all very full drafts, of this address were found. In the margins of the pages little sums have been worked out—so many pages at three hundred words a page, four

thousand, five thousand words; a full hour's talking, and still so much to say! There are little notes framed in a sort of Oxford frame of lines reminding him, for example, to 'say more of bringing scientific method into *all* parts of school.' On the reverse of the pages of manuscript are trial re-statements. He tried back several times to a fresh beginning. There is a page headed 'The New School' and giving three headings: the first, which he afterwards marked as second, is, 'The faculty of each member shall be developed'; the second, which became the first, is 'Community service—no competition'; the third is, '*Outlook —aim*, more value than ability. Service. All are equal. The Spirit and the Bride say, Come. Let all that will, come.'

Then we find him trying over his ideas about science under a heading, 'What we claim for science.' Under that are a number of interesting sub-heads :—

'Its own value in the great discoveries.
'That its spirit is that of life, giving, changing, searching. [Marginal note :— Without being deterred by any of the results which may follow.]
'It is "natural" to the vast number of boys.
'Very directly applicable to needs.
'That it has a language and a message. [Marginal note :— It seeks to test, to create new standards, to fearlessly rewrite knowledge.]
'The same spirit. [? as Christianity : *Editor*.]'

Finally he produced a draft which was at least his eighth. This he had printed and this he may have intended to read to the meeting. But he did not do so. In the end he spoke from a fresh set of notes, which must have been at least the ninth draft. We give here the whole of this printed address. It differs widely from the actual things he said, and the two will illustrate and illuminate each other. The printed version is on the whole rather

clearer than the actual address, but it is thinner, poorer in allusions, and less intimate.

'I have the privilege to address the members of the "National Union of Scientific Workers." You form a community of men and women of the same aims and outlook in life, with the object of bringing mutual sympathy and help to the performance of the great work that lies before every one with a scientific training or a scientific mind. Such a guild is urgently needed now because there is an immense field in front of Science. We live in a new world created by science, and therefore requiring men of science to direct and manage it. It is little use to employ a coachman to drive a motor-car or a flying-machine. There is no part of human life which has not been created or transformed by the discoveries and inventions of science. Industry, social organisations, and international relations have all come under its drastic influence. And scientific men are needed to manage them. Scientific men must not be restricted to the technical field—they must bring their methods and ideals into the management of affairs which they have done so much to transform. So urgent is this need that it has been said by Professor Soddy, and others, that for the moment we might be content to close down on all further inventions so as to set scientific men free to manage the social and international mechanism that they have created. The world has constantly resisted and rejected men of the creative type—and evolution has been retarded through the ages. But the vast scale of industry and all the creations of science have broken up the old methods of organisation and management and forced upon the world the desperate need for a new system.

'Mechanical changes shown in innumerable inventions such as dynamos, aeroplanes, wireless telegraphy, gramophones, and cinemas, have rushed on beyond the organisation required for them and the changes in human beings produced by them. There has been a race between the inventions and organisations—and the result has been the war. The war itself was the natural result of the breaking

force caused by the shearing stresses thus set up. It was a result and not a cause. Industrial occupations stirred the mental faculties of the workers—for a growing number of wage-earners had to be skilled and intelligent. The stirring of the faculties made them aware of their potentialities and aroused their creative instincts. Such revelation of their capacities is proceeding at a marvellous speed. The problem before the world is the organisation of live and free agents. The most primitive and the most powerful of men's instincts is the instinct of self-development and growth—and this is the main factor in organisation. It is one thing to have laws for hard corpuscles, but another to deal with electrons or bacteria.

'We might expect that there would be chaotic and anarchic conditions in industry, in finance and economics, and in international relationships. Individuals, and groups of individuals, are naturally struggling for the freedom to express themselves and to make the best use of themselves. Nations and individuals alike have different capacities, tendencies, and outlooks—all of which must come into consideration in a new form of management or organisation. Organisations must keep apace with ideals—and ideals are for ever changing. The struggle between self-expanding individuals or nations, and the stereotyped conditions that restrict them, is, as our chairman has said, a race between "Education and Catastrophe."

'The war was a natural result of new life under old organisations. It was the sudden bursting of a huge shell filled with suppressed activities, desires, and forces. Out of the chaos that it has wrought, scientifically minded men must join together to evolve a new social order. Fortunately the spirit of science is rapidly permeating all branches of knowledge. There is also a large and growing number of men, either directly trained in science or thrown up by active employment in industry, ready to take up the new organisation.

'The chief duty of scientific men in the new era is to bring all their methods and standards of value into the

whole field of human activity. And to these methods and ideals they must remain staunch and faithful. With such a spread of scientific effort, a great change will come over the social system. Far greater than the rapid change spread over biology, and thence over other branches of knowledge, by Darwin's theory or Mendel's or Pasteur's, it will be a rewriting of all the standards of value. So there will come a new order of economics, finance, ethics, diplomacy, administration, under the influence of the spirit of science.

'But we are often told that men of science fail in any responsibility outside their purely scientific field. The true fact, however, is that men of science have very rarely had the opportunity of making the necessary changes in aims and methods. They have not been able to transform our standards.

'The business of scientific men is not all to work for the same definite ends by the same rigid methods. If they attempt to do this they are, if truly scientifically minded, likely to fail and fail badly. They must have the courage and the opportunity to bring all their own ideals into the service of man. They must have the chance, too, of selecting co-workers of like-minded men and women. We have the highest example of the fact that the first duty of a leader is to surround himself with co-workers in sympathy with him. "Jesus said unto His four disciples, Follow Me, and I will make you fishers of men. So they forsook their nets and followed Him." There must always be a large number of scientifically trained men whose best service will lie in the new organisation

'What is needed, and naturally enough needed, is that our executive and administration should be transfigured by the influence of the new spirit, which science has not indeed created, but crystallised. Very rarely do scientific men get this opportunity. Here indeed is the great duty of the Guild of Science Workers.

'It is a useful thing to have charts drawn showing the coming of the numerous branches of human knowledge:

showing how they run into each other, how branches or streams seem to come from afar and coalesce at a nodal point, how from this nodal point new streams flow. The new era will raise up workers in all these streams. This, I am sure, has been abundantly illustrated in this theatre in which I have the honour to speak. The pressing need to-day is for scientific workers to bring their services into schools, into industry, and into national and international affairs.

'How can science enlarge its borders, and bring its own spirit and methods into all the fields of human endeavour? How can it show the need for new standards, and how can these new standards be used to guide organisation?

'I think I shall best be able to illustrate the kind of work which may be done if I give an account of an experiment which it is dawning upon me I have unconsciously been trying for at least thirty years. It is really an experiment on the application of science. I began about thirty-six years ago to introduce into schools applied science of the technical type, with the result that fairly soon afterwards I was led to introduce the methods of the scientific laboratory into other parts of the school curriculum—notably history, literature, and later on music and languages. Slowly the influence of the application of science began to change the organisation, the standards, and the methods of the school life.

'(*a*) The method of promotions began to be changed. A boy who is taking his share in some technical work would be found to be an excellent worker in some one part of it: he might not be estimated high by the ordinary school standards, but his services could not be spared: so in making new groupings of forms for special service he would be promoted. Again, a boy would be found highly talented in some special way—it might be in horse-shoeing, or in drawing, or in a language, or in research: he too would be wanted. It soon becomes clear that no boy can be dispensed with, and that it is a risky thing for good and full service in a school, where such a variety of capacities is required,

to reject a boy by the crude process of an entrance examination. Such experience abundantly shows that a community can find full use for all its members; that in a large way every one is of equal value; and that the duty of any community is to stretch all its powers towards giving each one the opportunity of experience and work. Parents will agree that it is desirable that their sons should have these opportunities. It is not difficult to see what this will mean in industry and in the nation.

'(*b*) What I think is a valuable corollary follows from the organisation for each individual. When you have arranged a school into sets—not by ordinary promotion, but according to the service each boy can give, and in direct reference to the boy's own growth (physical, mental, and spiritual)—and have, at any cost, got all the plant required for his work, you can say to him, and indeed to his parent, "When you go forth into the world and have charge of others, see to it that they have like opportunities."

'It is truly a modern version of the "Duty towards your neighbour"; it is a practical definition of love. And there is little doubt that a school will thus form the source out of which duty, service, morals, may be evolved.

'(*c*) A second fact soon began to be established in the school—when the opportunities for practical community work of all kinds followed on the limited engineering science, and further when the workshop method was adopted in history, literature, economics, art, languages. Boys found themselves, curiously enough, attracted by the special work they were doing. They were attracted by the kind of work, and they were attracted by the use made of the work and by the knowledge that a large number of boys were working for the same purpose. They responded to the selection, and to the opportunity, and to the environment.

'The power of competition—never very pleasant—dwindled, and in its place rose the curious but tremendous inducement of using their faculties, and using them for a common purpose.

'(*d*) It is no difficult step from the results of the passing of competition to another unexpected passing. It very soon became impossible for the director of the community to use any kind or manner of punishment, and, perhaps a little slowly and it may be with lapses, punishment came to be acknowledged as unnecessary, and suddenly the scales fell from our eyes and we saw that it is bad and impossible.

'Punishment is found to damage and hamper the highest form of discipline. It has a very serious drawback—it prevents the school or society or nation from setting itself to create conditions such that crime will not be committed. Punishment is a cheap and easy way. It enables a community to go on without the highly difficult thing of taking care of its members. For a school to carry boys without punishment all sorts of things must be done. Each member must be cared for; the whole community must adapt its manner of life so as to carry others in the stream with them. It is a hard life. It is what we may call dynamic—and thus creates energy and life.

'The result of the unconscious application of science and its methods has been the gradual evolution of a modern school, which in its turn has become the seed-ground of some new trials—a kind of experimental garden, after the manner of Rothamsted, where methods and ideals may be tested. I think there is no doubt that such a ground might be prepared.

'It is not difficult to see that a modern school is not created by the process of abandoning ancient studies. Far from it. Nor is it made by converting it into a technical school, or by adding science to the number of subjects taught. In fact, methods of education, and even the nature of the curriculum, are of very secondary importance. If these alone are the changes made, the soil will remain much as it was. We can see the same facts illustrated in industrial management. The industrial social life is not seriously changed by any change in the managing body, or in its methods of reaching its present aims. Such changes as co-partnership, profit-sharing, Whitley Councils, or national-

isation do not themselves change the social conditions. What is needed is a radical change in the aim or purpose of industry, and in its relative standards of value. So long as things are to be sold by auction to the highest bidder, it matters little who is the auctioneer or what the method of auction. A modern school is a school in which the spirit of science permeates all its life and aims.

'A modern school is one in which the aims in every part of it are for the work of science—service for the welfare of man in all races and languages and countries.

'A modern school is a school in which the spirit which we call the spirit of science permeates and changes all its methods, aims, and relative values. Such a school will endeavour to make the fullest use of all branches of knowledge and of all the faculties of all its members. It will have constantly in mind as its highest duty the welfare and development of all its workers; and its aim will be to do service for the community. By making the fullest use of each of its members it will break through the dual system of "master and slave." It will spring from the recognition of the right of every one to full development upon his or her individual lines.

'The school will therefore have to be built on a spacious scale, with a wealth of plant, apparatus, and opportunities for community work. In the language of the book of Genesis, the school must be a garden, full of all manner of trees, and here man is placed, and his purpose is to know his garden and to dress and keep it. When masters and boys come into the school they will find themselves in companionship with a large number of workers of like sympathy and outlook; they will find there observers with desire to do all that in them lies to add to the welfare of man; they will find, too, plenty of scope for their own particular talents and desires. The usual school studies will come more incidentally; they are really the tools, and class-rooms are the tool-making and shaping shops, all directed towards the main purpose of the creative factory. It will soon be evident that methods of teaching are of very slight import-

ance compared to the overwhelming urge to create and to do service and to master the necessary tools and their use. The sooner the whole body of boys and masters come well into this great stream of creativeness, the more powerful the body becomes.

'I will give an example of what can be done. Boys can be organised in groups of workers, called forms, according not to their standing but to their tastes and outlook. Such groups may be small: some may be larger. Boys can be gathered from the four winds of the school, from so-called high positions or so-called low positions, and a curriculum arranged for them by which they can bring their special aptitudes into service. For this quite an extraordinary number of different subjects will be wanted. If we could have a spectrum of all the branches of knowledge—and to draw charts of such spectra is a valuable piece of research work, and the resultant chart or charts a stimulating possession for a school—then the schemes of work would be like the well-known spectra.

'Eventually each boy will get into the work which he can best do, by which he himself will gain more of life. He will find himself, and know what part he can play; in a word, he will grow.

'It is not difficult to understand what effect this manner of life will have upon each boy, what effect it will have upon the unity of the community, and how it will alter all the standards of government and organisation.

'Boys will ultimately and quickly respond to all the care that is taken to make the best use of their services and to develop their capacities, and value every effort to organise opportunities for them.

'They will be surprised to find the changes made in their environment, and to find themselves liberated from what is not the best outlet for their energies and given opportunities in other fields. And it is surprising at first sight to discover the change which will thus come over "management" and "laws." It is surprising, too, to see how boys will respond to their opportunities, and how they

will be " bitten " with the intense desire to do good service, and how their interests will broaden out over wider fields.

' It is, we claim, a lesson for any nation or community. We can say to these boys as they go forth into the fuller life, " Our main purpose here has been to bring you into the great stream-line of life and growth ; to make everything in the school bend itself to your needs ; to ' dress and keep the garden,' that you may be free to do all that in you lies to serve the community and do good service. You have not been cast on one side and left out of the stream of life. When you go out into profession, or industry, or agriculture, see to it that as far as in you lies you will bring all your love, zeal and labour, and sacrifice, that each one within your influence or control shall have the same freedom, opportunity, aid."

' This practical application of the principle of the duty and obligation of society or the social and economic system, to do what reason, experiment, and experience reveal as a fundamental truth, brings us up to a new significance of the ethical standard of love and of our duty towards our neighbour. When the rich young ruler asked what was the rule of life he should follow, our Lord candidly told him that not only should he be constantly striving for new ideals and standards of life and service, but further that he should strive to give others the full opportunity for doing the same. It was asking a hard thing—this practical economic significance of love. It is a very weakened form of love to translate it into personal forms of courtesy, charity, and small eddies of sacrifices. Well might the young ruler go away sorrowful—for he had great possessions.

' It is a tragic and pathetic fact that men of scientific temperament have allowed the Churches to drive the greatest creative literature away from them. The Old Testament and the Gospel narratives are the expression of the ideals of science, and show forth the coming of life to man, the building up of a new kingdom ; and there is in the Gospels a wonderful story of the life of one who

came to establish a new order of society. The Gospels are inspired by all the great ideals which modern scientific work illustrates, and within them is found a practical guide towards the methods and principles by which we can transform our social and political systems.

'Scientific men might well bring themselves to the discovery of the Christian ideals; "back to Christ" may be their motto. By so doing, and so acting, there will be evolved in action a new ethical code of laws.

'An immense field lies before scientifically minded men, trained in the aims and methods of science. Such men are responsible for the present industrial and international conditions. No one can measure the changes already brought about by all their extraordinary discoveries and inventions. I need not here dwell upon this. Mr. Trevelyan has given a clear and striking summary of the growth of this new industrial world, and of course all the conditions and working of it are scattered over Mr. Wells's books.

'Herein lies the main work for scientific workers. Their work is to bring out a new organisation, in the first place, of industry. Treat it like a school. Bring into it new aims and new ideals. Transform it. Let no one say that it is impossible, and that these ideals are all old—for such are the famous effects of the natural resistance to change. These are a part of the inertia of idealism and thought. It is this inertia which requires the impulse of a live faith and enthusiastic belief to overcome. It is the inertia which, step by step, the practical experiments in small communities—such as schools—will overcome. Resistance to change is probably one of the great fundamental things in human nature: the state or condition at any particular time of the individual or community is not a fixed natural characteristic. It is not that the new ideal itself is contrary to human nature, but that the resistance to change is a part of human nature.

'For those who investigate the history of life as it has come to the human race, with the evolution of ideals and creative activities—work which should be engaged in

continually by all ranks in a school or, in fact, a nation—there is in all these seeming conflicts and struggles no cause for alarm. They represent the actions and reactions of a new birth. It might be possible by some form of force, or by some fatal soothing of the system, to get a semblance of peace, but life will not come in that way. " I came not to send peace on earth but the sword." " The secret of a joyful life is to live dangerously." The history of mankind in the making would lead us to expect the coming into active prominence and effectiveness of new standards of value, and would lead us to rejoice in a great epoch of changes which will recast our institutions and organisations. We may firmly believe that no changes are possible, but we must admit that there are many changes which are urgently needed in mankind's present conditions.

' It is reasonable to believe that changes will become possible when the temper of man is moulded to the ideals which inspire them. The work before us in the coming era is to drift the thoughts towards the love of mankind—to build up true love on a foundation of rock—to stiffen and strengthen love that it will not soften down to static conditions.

' To cultivate this attitude of mind science should be studied in the true scientific spirit and atmosphere. The danger is that the work in science in class-room or in the laboratory will " slither down " into doing set experiments, according to fixed syllabuses. This will not embody the vital elements of science—*i.e.* discovery, uncertainty, doubt, service, mysticism.

' A way of escape from the danger of science, in school or college, losing its special gift of a living and growing thing is to give constant work in the immediate service of the community, in research in those many abundant harvests which are calling out for labourers. In all branches of knowledge there is a universal amount of research work which schools can well be engaged in, much of which requires such labour. The work for each term or year should be controlled by the evolution of knowledge and

needs of the day. Boys must be marched up to the frontier of the unknown; they must be immersed in the ordinary life of the people.

'Without such aims and efforts science in schools will be dead and valueless.

'Schools, we believe, should be miniatures of the world as we would like it to be. At present they are naturally enough based on the dual system which is represented by master and slave. A little consideration will show that this ground principle of master and man permeates all parts of school life—its standards of values, its laws, its punishments, its organisation, the relative importance of its studies, its aims. These aims are to train boys for management—for leadership. But it is almost certainly true, scientifically and historically, that training of any kind is damaging to the natural evolution of life. Training for leadership is a part of the dual system which is the ruling principle to-day. It is perhaps not to be wondered at that this principle has determined the course of studies, the kind of books read, the interpretation of the books. It has influenced some of the most renowned of books, and such apparently invariant things as Latin Grammar and English Dictionaries. Under the new light which is coming into the world, however, these influences can be easily seen and traced.

'But to those who are immersed in the history of man, are trained in the school of scientific thought, and are filled with the love of the search for truth—that truth which makes men free—it is obvious that the dual system is, stage by stage, passing away. At each epoch in history it has changed its form, the nexus between the two elements has changed and weakened. During the last century these two sections have passed into each other by a form of osmosis. The scientific nature of the workers' work has led them to a high position of self-determination.

'One of the most essential studies is the investigation, both biological and historical, of the conditions of growth. Such a study will require the combination of a large number

of subjects. In the course of it, again, the temper of the mind and soul will be modified, and this change alone will make things possible. It will lead to a new attitude of mind towards such principles of growth as is expressed in the word " competition."

' At the moment competition is held by most people as essential to growth. Competition is firmly and honestly believed to be the one great incentive to endeavour. It is a very complex instinct—but here a school can form the unconscious experimental ground. And as, I think, might be expected, competition is really a very poor and ineffective stimulus even amongst the so-called able boys, whilst it damages the desires and outlook of the others. It divides the school into two unequal parts with different outlooks on life. It damages the school as a single body working for the community. It throws out the necessity for artificial commandments and laws. The unequal march of the members of the community sets up those shearing forces which in the end break the community.

' As we have seen, the duty of a school (as of industrial and social systems) is to engage each of its members—masters, boys, and the household—in the kind of service they can best give. Ultimately they will give it. The urge to service and to create is not an unattainable ideal; it is at the basis of every activity—even under the most competitive circumstances. The tone of the community, and of sections of the community—such as in a school, a form or set—is of a different quality when the workers are impelled by the outlook of service given. Boys then feel themselves free. They are free to act without hope of reward or fear of punishment.

' Competition is no doubt a primitive instinct, especially in the social life of the herd, but the development of the individual and of the herd has been the increase of the creative instinct over the acquisitive or competitive. " He must increase; I must decrease." In the rush of industry under the old ideals the spirit of competition has so swollen as to reveal itself and exhaust itself.'

On 15th June 1922 Mr. Sanderson met Sir Richard Gregory, the editor of *Nature*; Major Church, the Secretary of the National Union of Scientific Workers; and his chairman at the London University Club in Gower Street. The little party had tea together and chatted very pleasantly. Mr. Sanderson said he had spent the morning at Rothamsted and that he was feeling rather tired, but he did not appear to be at all ill. He had also been to an optician to get a pair of spectacles, and these he displayed. They were made of a new sort of clear glass, opaque to the ultra violet rays. The little party was joined by Dr. Charles Singer, the historian of classical science, and the conversation turned upon the first use of optical glass and its influence upon scientific discovery. In order to save Mr. Sanderson any unnecessary fatigue a cab was used for the short journey to University College.

We have already given in our introductory chapter a few words of description of the gathering in the Botanical Theatre in Gower Street. The chair was taken by Mr. H. G. Wells, who is the father of two old boys. He spoke of Mr. Sanderson as 'one of the most inspiring of living educationists and one of the very greatest headmasters the world has ever seen.' He warned his audience that Mr. Sanderson was sometimes not easy to follow. But at Oundle the elder boys would tell you, 'When the old man seems to be talking nonsense then it is time to listen, and when he seems to be wandering most then it is that he is coming to the point.'

Mr. Sanderson followed. He spoke from rough notes with occasional pauses, and at times in fragmentary and unfinished sentences, so that the reporters were often very evidently in difficulties. But by comparing a very full shorthand note with the manuscript and printed drafts he made it has been possible to reconstruct nearly all of

this memorable discourse. And let the reader remember that this discourse is not the theorising of some secluded writer about education ; it is the ripe and final talk of a supremely prosperous schoolmaster of a great and tried school who has from first to last dealt, and dealt with conspicuous success, with the lives of some thousands of boys.

' It is a great honour,' he began, ' to come and address scientific workers (I have only recently discovered my claim to be a scientific worker), and to describe to you what has turned out to be a scientific experiment. I hope to show the results of an experiment carried on, not in a scientific laboratory so-called—physical, chemical, biological, or anthropological—but in a school for boys.

' Before doing that, I should like to say that we scientific workers do very much depend on having a number of us together. One scientific worker placed in charge of any great work finds it difficult ; scientific workers do not get the chance of appointing men in sympathy with themselves often enough ; so it is frequently said that scientific men placed in command of a factory in industry or a department of state at home or in the colonies fail. Well, if so, they fail because scientific men have not often got the opportunity of getting men of like sympathy to work with them. I take it that the object of the National Union of Scientific Workers is to get scientific men with scientific views of life and experimental experience to join together in some great work. When I speak of the duty and service of science in the new era, I mean that I want scientific men to claim justly a larger share in the work of the world, and not to confine themselves to what is called purely scientific work. We want them to expand themselves over a wider area. As a matter of fact, that is what two distinguished

writers have suggested : that the time has come when the ordinary discoveries and inventions of science should be closed down in order to enable scientific minds to do this simple thing. Practically everything that exists now is the work of scientific men, their discoveries and their inventions. The whole world teems with the results of the work of science. The great machines we see used in industry—the industrial machine itself—have been created by men of science. Now, I put it to you that when motor-cars came in the nobility of the land found their coachmen of little use. The scientific machine requires scientific men to manage it. Our industrial life is imperfectly organised ; all our troubles are due to the fact that we have a process created by science, but organised in the old way by men of a different outlook. The discoveries of science have rushed into the world a considerable amount of unexpected ability. Working men engaged in industrial pursuits have had their intelligence discovered and brought out, and it is one thing to control a mass of human beings who are not thus inspired with the knowledge of their own possibilities, and another to control those who are. It is like trying to control a set of live molecules. It is one thing to control a hard atom and another to control a live electron.

' So that the duty and service of science would seem to lie in scientific men bringing their ideal of life, their standards, their vision, their outlook, and their methods to organise the great machine that their inventions have created. You cannot have a world half scientific and the other half nothing of the sort.

' That is to say, scientific workers will have to consider the whole question, for instance, of economics. I heard yesterday a distinguished member of the Government saying that we cannot change economics. Of course, that

is one thing scientific men have got to do, to change economics so that the system of our industry shall be re-created. The system of management by dual control of the master and the slave will not work when the slave becomes an alive, active, intelligent, anarchic being. He will not be governed by the rein but by a system which the magnet can influence. However, the last hundred years has resulted in a race between the changed conditions that science has brought about and the organisation required to control them, in what has been called by Mr. Wells a race between education and catastrophe. In scientific language, it has produced a serious stress because of the hurrying on of change of conditions and the lagging behind of the methods of controlling them. It is this stress, I think, which has broken up the system. You may say that the war itself is no cause of anything, but a result of the purely automatic action of shearing forces, as when a testing machine breaks a metal bar.

'The end of the war has left us with a whole host of individuals set free, and the business before science men is to organise this new body. It is a big problem, and requires scientific thought, temperament, and outlook, to rewrite practically the whole of our knowledge. It reminds me of the tremendous rush there was amongst scientific men to provide workers to overhaul practically everything in biology (and theology) and other parts of human knowledge after the doctrines of Darwin were well established. I take it that all the departments of human life have to be rewritten by men under the influence of the spirit of science. Our books have to be rewritten, our very dictionaries. I have often amused myself with the *Oxford Dictionary,* or found it necessary to send a boy to that authority for a definition, and it has pretty nearly always been false. Take such a simple case as the word 'demo-

cracy.' The *Oxford Dictionary* hasn't a thing to tell you about the meaning of 'democracy' as we use it to-day. It tells you nothing of the living use of words. That is one of the terrible dangers of leaving our books in the hands of men who have not got that outlook which experiment in science brings to the individual. Consequently, I see that the duty of scientific men is to scour the whole area of knowledge and rewrite it to bring out new standards, new values, by means of which labour and industry itself, in the first instance, can be reorganised (the schools first should be reorganised), and then you can extend it into the wider area of international affairs.

'They tell us that economics cannot change our human nature. That is the great duty and service of science—to change human nature. Scientific men have to collect a band of disciples and make a new world. As far as I can gather from a long connection with boys, the only scientific quality which is constant is inertia in response to change. The actual change itself, when it has arrived, no one objects to, and every one says, "Why didn't we do that before?" Scientific workers rarely have their full opportunity in industry. To have their full opportunity they are to set forth in the spirit of the Great Master to found a new kingdom: not to manage industry by the standards and values of the present, but to transform them. And they must do what our Master Himself did—collect a faithful band of disciples imbued with the same belief. I know it is freely said (I have been corresponding with some of the leaders in industry) that scientific men cannot do this thing. They can, if only they are true to themselves and their vision; they can absolutely change the whole system under which industry is worked, and change the world to their ideals.

'"Come and I will make you fishers of men. . . ." The

great work that lies before scientific workers to-day is to extend the area of their labours, to become not fishers of facts but fishers of men. There will always be a distinguished band of purely scientific men devoted to pure science, who will abide devoted to pure science; but with the present number trained in science, we claim them also to organise the machinery that science has created. They must leave their ships and nets and become fishers of men. . . . I dare say even scientific workers know that it is from the Bible. One of the greatest tragedies scientific men have allowed is for others to steal the Bible from them. The Old and New Testaments, with their record of progressive revelation, form the most scientific book ever seen. Yet scientific men have allowed a certain type of men to steal it from them. Bible stealing is an old thing, and one favourite method is to bind it in morocco and to put it on a top shelf. . . .

'But I must return to my scientific business. When I was at Cambridge I was not regarded as scientific. I was amongst those who took mathematics, and those who took mathematics and classics were respectable and had to attend chapel. But if you inclined at all towards science, or even ethics, you were not supposed to attend chapel. . . .

'I said that I have recently discovered I am a scientific worker, that I have been working a scientific experiment, though not of the kind accepted for report to the Royal Society. It has been worked by being headmaster of a school for thirty years and by having taught for forty years. When I became a headmaster I began by introducing engineering into the school—applied science. The first effect was that a large number of boys who could not do other things could do that. They began to like their work in school. They began to like school. That led on to introducing a large number of other sciences, such as

agricultural chemistry, horse-shoeing (if that is a science), metallurgical chemistry, bio-chemistry, agriculture; and, of course, these new sorts of work interested a large number of other boys of a type different from the type interested by the old work, so we got an exceptional number of boys, curiously enough, unexpectedly liking what they had to do in school. Then I ventured to do something daring; it is most daring to introduce the scientific method of finding out the truth—a dangerous thing—by the process of experiment and research. We began to replace explicit teaching by finding out. We did this first with these newly introduced sciences. Then we began to impress the aims and outlook of science on to other departments of school life. History, for instance: we began to replace the old class-room teaching and learning by a laboratory for history, full of other books and other things required in abundance, so that boys in all parts of the school could, for some specific purpose (not to learn; to go into school to learn was egotistical), find out the things we required for to-day. We set them to find out things for the service of science, the service of literature, modern languages, music.

'This began to change the whole organisation of the school, its aims and methods. It was no use organising boys in forms by the ordinary methods of promotion for this sort of work. You have to make up your mind what you have to do, and then go about and collect anybody who would be of service to that particular work. You would require boys of one characteristic and boys of another. You make them up into teams for the particular work they have to do. The boys who do not fit into this or that particular work must have some other particular work found for them. You began to design the work of the school for them. You must have all the apparatus you

want for it, and you must organise for it, but you begin by organising the work for the boys and what they need to find out, and not by putting the boys into the organisation. Now, presently you discover, when you do this, that not a single boy exists who is not wanted for some particular work ; to carry out your object every boy is fundamentally equal. One does this, one does that. Each boy has his place in the team, and in his place he is as important as any other boy. Placing them in order of merit does not work any more. The scientific method absolutely changed the position towards class lists and order of merit. That was an alarming result.

'Another alarming result was that we could not have anybody who was not working. If a boy was not working, you could see that he was not working. You could see he was doing nothing. He could not sit in the back of a class-room and seem to be working. Everybody was working. You can manage that in school, but what about the world ? All sorts of people may seem to be working and not be working at all. The curate may be doing nothing ! This seems to land us into the extraordinary fact that no community if it is scientifically organised can carry any one who does not do service. I hope you will agree with me that that is scientific.

'A little farther on I turned round on the boys and the parents. (Both are my business.) I said, "I have and the school has tried all it could to see to it that your boy got the right kind of work to do. We spared no trouble or expense to see to it that he might be able to perform his service in the school and to the community. . . . When you go forth to your father's works, keep in mind that it is your business to see to it that every person who comes within your influence has a like opportunity." That is totally different from your duty to your neighbour as

taught in the Church Catechism. We have landed ourselves hopelessly in the position of having a practical community definition of our duty towards our neighbour. You remember the rich young ruler who came to ask what his duty was, and went away sorrowful because he had great possessions. Some of these possessions were perhaps intellectual. I like to think of Watts's picture of that man and I like Watts's idea that he came back. I hope if any of our boys go away they will come back.

'Another step. This actual love of work spreads, and ultimately every one comes within its influence and they begin to like the service they are rendering. Finally, competition dwindles and passes away, so that we have reached what appears to be a change in human nature. It is not really a change, but by care and attention calling out what has always been ready there in human nature, namely, a first instinctive love to create. I have always held that competition is a secondary interest and creation a primary instinct. Competition dwindles and passes away. Competition is a very feeble incentive to live. It is cheap and easy to arouse the motive, it is a swift motive and on the surface of things ready for you, but it is not even a powerful motive. Half the boys it dispirits and leaves idle and useless.

'The passing of competition leads on to another thing passing away, which is this: you soon find that a body of workers that as a community has attempted to provide for itself, as a community adapts itself to the community spirit, and punishment is totally unnecessary. It was a long time before that dawned on me. I have not, as a headmaster, taken any part in any shape in punishing boys directly, either by the easy methods supposed to train them for after life or by the other methods that have sprung from the fertile brains of a dominant order. Punishment, I

THE HEAD

declare from years of experience in this experiment, is a crime : not only a crime but a blunder. Why ? Because it is a cheap and easy thing. If you punish it is easy, but if a community has so to arrange itself and adapt itself as to produce the reaction on the individual not to do objectionable things, that is hard. It is complicated. It requires an abundance of real sacrifice. It demands readjustment of everything upon a basis of service. I have been much impressed recently by the effect of having punishment organised in removing any activity on the part of the community itself towards adjusting itself so that punishment should not be necessary. I used to flatter myself, " I don't punish that boy, my prefects do ; they keep me right." But I have been convinced by my thirty years of experiment that that was all wrong. These things come slowly. Now, without any action on my part, the prefects have stopped punishing, and a good thing for them. If they leave their boots about, the small boys will too, and they will have to punish them for doing so. To leave your own boots about like a lord is a fine thing, and to punish the small boy who does so is also a fine thing ! But it is easy. The hard thing is never to leave your own boots about. . . .

' The reactions that we have been taught to make in the world are weakly static. What is the good of static methods ? There is friction ; we are told how to overcome frictional resistance. We can put an end to friction by stopping the machine. That is the static method of dealing with friction. Or we can go on working the machine, with oil and care . . . which is not so cheap and easy, but which gets somewhere. . . . If we try to remove friction by the static methods of punishment we are removing the incentive to live a dangerous life. " The secret of a joyful life is to live dangerously." You only live dangerously if

you are perpetually trying to overcome your own inertia and trying to get the capacity to do great things. If you are only defensive, static, it is waste of time. Yet those defences and resistances are securely placed in the governance of the state. What a curious thing is the form of government! Its characteristics include no repentance, no regret, otherwise it would acknowledge itself less than the master. Its ideal is a perpetual static calm. "Suaviter in modo, fortiter in re." It is the method of people who perform the confidence trick. It is the method of "If you want peace prepare for war." ' . . .

For some minutes Mr. Sanderson paused. He looked at his notes. He was obviously very fatigued, but very resolute to continue. He read :—

' Acquisitiveness leads to these glorified things : general science, general knowledge, national history, scholarships, examinations, advanced courses, "interesting" things (whoever wanted to be interested ?), the theological thing called "syncretism," tact, swindling.' . . .

Mr. Sanderson stopped and smiled in a breathless manner, half panting, half laughing, very characteristic of him. His glasses gleamed at the audience. His smile meant : 'We are going a little too fast, boys. Where are we getting to ? Where are we getting to ? ' He affected to refer to his notes and then broke away upon a new line.

' Out of all these things I have been telling you, out of all these considerations, evolves the modern school. The modern school is not made by the very simple and easy method of abandoning Greek. (Laughter.) Nor is it made by introducing science or engineering. The modern school's business is to impress into the service of man every branch of human knowledge we can get hold of. The

modern method in the modern school does not depend on any method of teaching. We hear a great deal about methods of teaching languages, mathematics, science; they are all trivial. The great purpose is to enlist the boys or girls in the service of man to-day and man to-morrow. The method which makes learning easy is waste of time. What boy will succumb to the entreaty: "Come, I will make you clever; it will be so easy for you; you will be able to learn it without an effort"? What they succumb to is service for the community. I have tested that in the workshops. They don't want to make things for themselves; they soon cease to have any longing desire to make anything even for their mothers. What they love to do is to take part in some great work that must be done for the community; some work that goes on beyond them, some great spacious work. You can spread them out into all sorts of spacious things, in all departments, such things as taking part in investigating the truth. The truth, for instance, of the actual condition of the coal-miners or of any miners. An important question which we have been concerned with for at least three years is "*What is China?* What is it like?" You may say, "Methods of teaching geography." But who ever learned anything from geography—as geography? Who wants to know geography as geography? Books exist for it, maps, plasticine exist for it. We want to know about China. If we are going to see to it that every one of our working men has the same opportunities that in our school we give to our boys we shall have some difficulty with China. We shall never be able to give our working people these opportunities unless the Chinese give them too. Scientific men must find themselves dominant in the Foreign Office and Colonial Service so as to know what is the nature of the people in these distant places, how we can bring to them what we are

able to give to our sons—the opportunity of making the highest and best use of their faculties. We shall not get that sort of thing from the geography books. You will have to take the boys and let them find out what men have done who have been in China ; to get products from China ; to know its geology, and whether after all, the Chinese do so deeply love rice that they want to live on a very little a day. Do the Chinese love rice ? Do they love underselling white labour ? Do they want to ? That is real geography, but not class-room geography. That extension of interest, until China is brought into the class-room and the boys are finding out about it, is, I claim, one of the deepest and greatest tasks to be undertaken. China—India—the Durham miners—spacious undertakings. . . .

' Schools must be equipped spaciously, *spaciously,* and they must have a spacious staff. I have the list of our staff here. We have masters for mathematics, physics, chemistry, mechanics, biology, zoology, anthropology, botany, geology, agriculture, classics, history, literature, geography, archaeology, economics, French, German, Spanish, Italian, Russian, Eastern languages, art, applied art, handicrafts, and music.

' " Impossible," some people say. There is no great school in the land but can quite well afford it. . . .

' We must send out workers imbued with the determination to seek and investigate Truth—truth that will make them free—and to take great care that in the search for truth they will never take part in or sympathise with those methods by which the edge of truth is blunted.'

The speaker finished and sat down amidst applause. The chairman rose, and then, struck by a thought, whispered to Mr. Sanderson. Would he answer questions ?

' Why, certainly.'

'Not too tired?'

'No—no.'

The chairman turned to the meeting. 'I think you will agree with me,' he said, 'that you have heard not only one of the most interesting and suggestive but the most curious discourses you have ever heard. It is not always easy to follow Mr. Sanderson, but he is worth following into the remotest corner. He has a style of discourse which I can only compare with some of the modern practices in painting . . .'

The chairman never finished that sentence. Mr. Sanderson gave a little chuckling laugh at the comparison and then sighed and slid from his chair to the floor. The chairman glanced over his shoulder and turned round in surprise and dismay. There were several medical men at hand, and in a moment they were stooping and kneeling about the prostrate body at the back of the platform. The chairman after a brief consultation with those about him declared the meeting at an end. The people began to disperse, but some joined the reporters in a cluster immediately below the platform. Some one began opening all the windows, for the air was very warm and heavy. . . .

It fell to the chairman to break the news of this swift death to Mrs. Sanderson. She was in London and out shopping. He had to wait for her in the lounge of her hotel and to see her descend from her car and come up the steps to the hotel entrance. She was carrying several parcels and she was smiling in the pleasant busy holiday mood of a schoolmaster's wife away from school. Mr. Sanderson had known that he was over-exerting himself, and so he had kept this address of his as secret as possible from her. His heart had been set upon it. She greeted Mr. Wells cheerfully; she did not realise at first that anything un-

usual accounted for his appearance at the hotel. She was told that her husband had fainted at the end of his speech and that she must go to him at once. In the brief journey to the mortuary chapel of University College Hospital the poor brave lady was prepared for the truth.

It was at the same hotel, four years before, that the news had come to her and her husband that their eldest son, Roy, had been killed in France.

THE END

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